

Railway Age

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Fortunate in Their Enemies

THE sponsors of the so-called "Baltimore & Ohio plan" for union-management co-operation in the shops owe a vote of thanks to the "International Committee for Amalgamation in the Railroad Industry," which met in Chicago in September, and to William Z. Foster in particular. Why? Because the majority of this group, which fortunately is entirely unrepresentative of the railroad employees, and Mr. Foster so scathingly denounced the plan. And the American people, knowing Mr. Foster and his Communist crowd as they do, are not unlikely to feel that anything which they oppose hardly needs a better recommendation. But even in Chicago committee the Communists did not have it all their own way. Mr. Foster reports:

The debate made it clear that class collaboration, or "co-operation" as it is politely called, has made great inroads among railroad workers . . . Against the arguments of these "co-operationists," the left wing of the conference levelled its heaviest guns, pointing out that the movement for the "B. & O. plan" is defeatist in character and follows a policy of surrender, that it is diametrically opposed to the militant amalgamation movement, and is sucking the very life's blood out of the railroad unions.

Somehow we cannot imagine either the employees or the management on roads where the plan is in effect as being particularly grieved at the lambasting they have received from Mr. Foster. Instead they probably feel more like thanking him. There is a good deal of honest difference of opinion concerning the merits of the B. & O. plan, but certainly the enmity of the preachers of class-hatred can not detract from it and may even serve to boost its popularity with most real Americans—whether they are employers or employed.

Attention to Details in Employee Relations Work

THERE is a distinct advantage to the railroad in having its passenger trainmen at all times neat in appearance. Yet to preserve this appearance in the service entails no little trouble and considerable expense to the men. Indeed, some have been heard from who go so far as to say that the present differential between the wages of freight and passenger service is not great enough to offset the expense involved in keeping up the sort of appearance the managements expect; ergo, the passenger trainmen ought to have an increase in wages. It is estimated by some persons who are intimately acquainted with such matters that a passenger trainman ought to have his uniform cleaned and pressed after every two or three days of service, if he is to appear as he should as the representative of the company with the public. A little arrangement by the management on behalf of all employees with some local cleaning establishment could probably bring about a great reduction in the cost of such service which the men now have to bargain for as individuals.

Perhaps the management might even find it expedient to share some of the expense. Such action would certainly be a more eloquent plea for neatness than a score of bulletins on the subject. Moreover, the smallness of the differential which some passenger men think they now perceive between passenger and freight service might appear correspondingly larger and, consequently, more nearly satisfying. Locating and adjusting apparently trivial matters such as this offers one of the largest fields for effective employee relations work. The employee says to himself: "The company expects me to look out for its interests in the smallest details wherever I can. Here is a place where they could do the same for me with very little effort and practically no expense." The effects of doing the obvious thing in such circumstances are generally prompt and gratifying to all concerned.

Needs of the Younger Men

MANY members of the New York Railroad Club enthusiastically insist that the "Younger Men's Night" which was observed last Friday evening was the most interesting and constructive meeting ever held by the club. Two of the railroad clubs, the Western and the Central, last year gave special attention to the needs of the younger men by setting aside meetings for this purpose. While both of these programs proved successful, the New York Railroad Club went a step further in that the young men themselves were featured on the speaking program; indeed, the only other talks were incidental, in the way of introduction of the young men or words of appreciation at the close of the meeting. The seven young men represented as many different railroads and as many different vocations. Here were represented not only mechanical department apprentices, regular and special, but young men from the engineering, maintenance-of-way, accounting, transportation and clerical departments. The program was thus not only more or less balanced from the standpoint of the railroad organization as a whole, but special attention was directed toward the opportunities and needs of the young men in departments which in the past have not concentrated as much attention upon the placing and developing of the young men as has the mechanical department, with its apprenticeship courses in the various crafts, as well as its special courses for college trained men. Railroading is continually growing more and more difficult and complicated. This means that bigger and better trained men must be provided to meet the future needs of the railroads. We of the present generation must face this problem squarely and accept the responsibilities involved. The railroad clubs are to be congratulated on entering into this movement, which has been receiving the attention of far-seeing executives and officers, and which has gained a real impetus through the younger railroad men's international annual conferences, which were inaugurated a few years ago under the auspices of the Railroad Y. M. C. A.

Changes in Passenger Business

THE passenger business and earnings of the railways almost always reach their peak in July and August. Excepting that in 1923 the traffic was slightly larger than in 1922, there has been a continuous decline in passenger business since 1920. This decline has been so great that it is rather gratifying to find that passenger earnings in July and August of this year were but very slightly less than in these months of 1924. The first month for which the Interstate Commerce Commission published statistics in which it gave separately the figures for commutation business was July, 1921. Comparison of the statistics for that month with those for July, 1925, throws much light on the revolution that has been occurring in railroad passenger business.

Although the rates in effect in 1921 were higher than in July, 1920, the decline in passenger business within a year had been so great that passenger earnings declined from almost \$123,000,000 in July, 1920, to \$108,600,000 in July, 1921. In July, 1925, the earnings from passenger business were about \$97,650,000. Commutation business increased meantime. The number of commutation passengers carried in July, 1921, was 33,538,000. Their average journey was 15.24 miles and the revenue received from them was \$5,414,526. The number of commutation passengers carried in July, 1925, was 34,956,000. Their average journey was 16.25 miles and the revenue received from them was \$5,968,218. The average rate per mile paid by them in July, 1921, was 1.06 cents and in July, 1925, 1.051 cents.

Although the number of commutation passengers increased the number of all passengers carried declined from 90,841,000 in July, 1921, to 75,336,000 in July, 1925. Subtracting from these figures the number of commutation passengers carried shows that the number of non-commutation passengers carried declined from 57,303,000 in July, 1921, to 41,380,000 in July, 1925. The average journey of non-commutation passengers in July, 1921, was 54.54 miles, while in July, 1925, it had increased to 73.53 miles. The facts that commutation business increased, and that the average journey of non-commutation passengers increased so much, simply emphasizes what every railroad officer knew already—namely, that the bulk of the business that has been lost has been short distance business outside of urban and suburban areas. It has been taken away by the private automobile and the motor bus, mainly by the former.

In spite of the great increase in automobiles, motor buses and other means of urban and suburban transportation the number of people living in the cities and their suburbs who use railway trains is still increasing. Furthermore, the number of long distance railroad journeys being made is increasing. The acute problem of the railways is to determine what changes to make in local passenger train service outside of large cities. Throughout the country the people have ceased to use this service to such an extent that it is being rendered at an enormous loss. From the railway standpoint the problem presented could be largely solved by taking off a large part of the local trains. Although people use their automobiles in preference to these trains and patronize motor bus service in competition with them, strong objection is raised when the railways try to take them off. A question very commonly asked is as to what the people will do when weather conditions are such that automobiles and motor buses cannot be operated? There is also a strong tendency on the part of the press in some parts of the country to criticise the railways because they do not themselves operate motor buses. Railway managements are often criticised upon

the ground that they complain about the situation but do nothing constructive to deal with it.

The fact is, the problem presented to railway managements is an extremely difficult one, and that there is hardly any other problem to which they are giving more study. Meantime if the public insists upon the operation of local trains which must be run at a loss, it cannot reasonably object to the railways being allowed to charge rates upon other business remunerative enough to offset the big losses being incurred by operating local passenger trains.

Three Factors Favoring Bus Operation

THE railways unquestionably have a legitimate complaint against what F. W. Sargent, president of the Chicago & North Western, has pointed out to be the subsidized competition of the automotive vehicle. Mr. Sargent, in his address before the Chicago Association of Commerce on September 30, reported in the *Railway Age* of October 10, said that he intended no argument against the use of the motor bus or the motor truck. "I am only stating," said he, "that all forms of transportation should be placed upon an equality with reference to the burdens imposed upon them by governmental authority, and that we should stop taxing the railroads to support competing forms of transportation, including the motor buses, motor trucks, etc." It is one of the ironies of the situation that some few of the railways are undertaking the operation of buses on their own account or contracting with truck owners for the operation of trucks. Frequently if not usually, these buses or trucks run on highways paralleling the railroads' own lines. In such instances the railway is itself taking advantage of the highway and the subsidized service thereon which the carrier was taxed to help build or maintain. In taking such advantage it may be forsaking the right-of-way, all the cost of which it bore and to assist in meeting which cost it has not been aided, like the highway, by taxation.

But there is also another angle to the situation, namely, with reference to the frequent lack of regulation of the highway vehicle. Most states now require certificates of convenience and necessity for bus routes. There is, however, no regulation as yet of interstate bus traffic. The Supreme Court has declared that the states may not regulate such interstate service and Congress has not acted to establish interstate bus or truck regulation. Presumably it will so act in the near future. The difficulty will be that such regulation should be in the hands of the Interstate Commerce Commission to prevent divided responsibility, and that commission is already over-burdened with its present duties. Most states have speed limits for automotive vehicle traffic. It can be stated unequivocally that on many bus routes these speed limits are not observed. One interstate bus line maintains regularly speeds of 40 miles an hour or more over roads where the legal limit is 35. We have heard of heavily loaded buses making 65 miles an hour. Many drivers of pleasure vehicles will testify that they have had difficulty, while keeping inside the speed limits, in keeping up with the highly skilled bus drivers who frequently make pleasure driving a burden by the manner in which they hog the road with their heavy vehicles. Thus there is subsidized competition, lack of interstate regulation and failure on occasions to observe the rules of the road.

It is not surprising that the bus is proving such a formidable competitor. The railways are putting on more

and more buses themselves. Will they get into this development, perhaps, at just the time when regulation and control of buses will be more severe, and in such a way that much of this control will be directed at the railway buses? At least, the problem of meeting bus competition is a complicated one and will require the best thought to meet it properly.

The Principle of "Fair Return" in Regulation

THE most vital railroad question that is in process of determination is the question of what net return the railways will be allowed by the regulating authorities to earn. This statement has been made so often that its repetition again may seem "damnable iteration." Certain comments made by public men and the press regarding the net operating income now being earned by the railways, and concerning the testimony introduced in the hearings of the western rate advance case, show, however, that the legal and economic principles on which rest the justification of the railways in insisting that their rates be so regulated as to enable them to earn the so-called "fair return" are widely misunderstood. There is no more important work for spokesmen of the railways to do than to educate the public, public men and regulating authorities regarding this crucial point.

A significant illustration of the necessity of public education along this line is afforded by many comparisons that recently have been made between the percentages of return on property investment being earned by the railroad and agricultural industries. The Hoch-Smith resolution directs the Interstate Commerce Commission in fixing rates to give consideration to the conditions in the country's various industries, especially agriculture. The hearings in the western rate case are technically part of the hearings being conducted by the commission in the general investigation of freight rates required by the Hoch-Smith resolution. Therefore, it was incumbent on the railways to introduce testimony especially to show the present condition of agriculture.

Persons and newspapers that have not understood the true reason for the introduction of this testimony have, in many instances, criticized it upon the ground that it constituted an attempt to show that the railways are entitled to take away from the farmer some of his increased income. In other instances attempts have been made to show that the farmers are not earning on the average as large a return on their investment as the western roads, especially the more prosperous of them, and that while this is the situation the railways have no right to charge higher rates on farm products.

The discussion of the question whether the railways are making relatively more or less than the farmers cannot lead to any definite conclusion. The accounts of the railways are kept under a uniform system prescribed by the Interstate Commerce Commission and therefore it is possible to ascertain with great accuracy what returns each and all of them are earning. There is no uniform system of accounting by farmers. Furthermore, statistics regarding what the railways are earning are based on investments in property which for almost twenty years have been accurately entered on their books as required by the commission. On the other hand, calculations as to what the farmers are earning are not based at all upon amounts actually invested by them, but upon estimates of the value of their property which consists mainly of "unearned increment" in their land. Because of these and other facts

it is impossible to make satisfactory comparisons between the returns being earned in the two industries, although such comparisons as the available data make possible strongly indicate that the returns being earned in agriculture are relatively larger than those being earned by the railroads, especially in western territory.

Such considerations do not, however, go to the heart of the question of what return the railroads should be allowed to earn. How has it come to pass that what returns the railway should be allowed to earn has become such an important question in railroad regulation? In the very early history of such regulation the courts held that the rates of railroads and public utilities could be regulated because of the nature of their business. They were engaged in rendering public services, and therefore were not entitled to charge excessive rates. They were monopolistic or quasi-monopolistic, and might, in consequence, if not regulated, make and keep their rates relatively higher than concerns engaged in an entirely competitive business could make and keep their prices. The courts held, however, that the power to regulate was not the power to destroy; that for the government to make rates so low that the railroads could not earn a fair return would be unconstitutional confiscation; and that, therefore, rates could not be so regulated as to prevent the railroads from earning a fair return.

These decisions obviously meant, as have all subsequent decisions of the federal courts, that a "fair return" is the minimum to which railways can be restricted. The inference from this is plain enough. It is that if the public, acting through its government, exercises the power and assumes the responsibility of limiting the returns that may be earned in the railroad industry, it must at the same time assume the responsibility of seeing that the railroads do get at least a "fair return." By a complete misinterpretation of what the courts have held it has come to pass that many persons say the railways are not entitled to earn at any time more than a "fair return." This interpretation for years has been followed in regulating the railways, although nobody can read what the courts actually have held without knowing that it is wholly fallacious.

In every territory there are many competing railways which must make their net returns by charging the same rates. They cannot all earn the same percentages of return by charging the same rates. The only practical solution of the problem presented is to so regulate the rates as to enable all the railways of a group to earn an annual average equivalent to a "fair return." Traffic, earnings, and operating expenses fluctuate from year to year. It is impossible to so adjust rates that the railways as a whole, or of any group, will on the average earn exactly a "fair return" in each year. If the rates were so regulated that in no year they would earn less than a fair return, the result would be that in most years they would earn more. On the other hand, if the rates were so regulated that they would in no year earn more than a fair return the result would be that in most years they would earn less. Here, again, there is no practical solution of the problem presented except that of so regulating the rates that for periods of, say, ten years the fair return will be earned as an average by the roads of each group.

The method of regulating rates on the principle of producing a fair average return above outlined was accepted by Congress in framing and adopting the provisions of the Transportation Act. The nation endorsed the passage of that law and repeatedly in subsequent elections has voted for its retention. Nevertheless, objections are constantly made to carrying it out and, in fact, it has not yet been consistently carried out. First, it is asked why the government should assure to the railways the opportunity

to earn a fair return when it does not assure that opportunity to the farming and other industries. The answer, of course, is that the government does not regulate and limit profits in the farming, manufacturing, mining and most other industries, and there is no reason why it should assure them a minimum return as long as it does not limit their profits or in any way regulate them.

Again, it is objected that if the railways as a whole or by groups are enabled on the average to earn a fair return some railways will be able to earn more than a fair return. It is a singular thing that there are so many people who never seem to consider the obvious fact that if the railways on the average in any year earn 5½ per cent, and some earn more than this, then it must follow that others earn less. There is no industry in this or any other country in which some persons and concerns do not get more and others less than the average return earned in the industry. If each railway is theoretically entitled to earn a fair return, and on the average as a whole they earn only this, the railways that earn less may have ground for complaint, but what reasonable ground has the public for complaint? It will cost the public just the same to pay rates that will yield to the railways an average of 5½ per cent as it would to pay rates that would enable each and every individual road to earn exactly 5½ per cent.

Again, if the railways for five years—the years 1921 to 1925 inclusive, for example—have been regularly earning less than a fair return and they finally begin to earn this much or more, some persons at once begin to raise an outcry, and to oppose advances in the rates of a group of railways that is not yet earning a fair return, and to demand a reduction in the rates of the railways that are earning this much or more. This kind of agitation obviously is based upon the assumption that the so-called "fair return" is a maximum which should not be allowed to be exceeded. For reasons already given, however, this assumption is wholly erroneous, and if regulation were based upon it the railways in at least four years out of over five would not earn a fair return, and at least four-fifths of the time the "fair return" principle would be violated.

We are now confronted with an entirely new objection to the consistent carrying out of the fair return principle. Some spokesmen of the farmers, as already indicated, are trying to show that the farmers are not earning an adequate return, or at least not as much return as the railways, and are contending that while this is the case the rates upon farm products should not be advanced to enable the railways to earn a fair return. If this is a sound argument from the standpoint of the agricultural industry, it is a sound argument from the standpoint of every industry. If it is sound from the standpoint of all industries it follows that whatever may be the cause of the condition, if any industry is at any time earning as small or a smaller net return as the railways the freight rates paid by that industry should not be advanced or should be reduced. On the same theory, however, if the profits earned in any industry become relatively larger than those being earned by the railroad industry the freight rates of that industry should be increased. Otherwise when the profits being earned in any industry were low the freight rates of that industry would be regulated accordingly, while when its profits were large its freight rates would not be advanced, and in consequence the rates paid to the railways by every industry always would be based on the lowest profits made at any time in that industry!

In every industry not subject to government regulation there are great fluctuations in the profits earned. When business is good the average profit may be 10 or 20 or 25

per cent, and when business is poor it may be almost nothing. The railways would not object to being so regulated that their profits would be much less than a "fair return" in lean years if they were also to be so regulated that, like most other industries, they would be able to make big profits in the fat years. This, however, is not the policy followed in regulating the railways nor has anybody proposed that it shall be, and therefore the contention that the rates of a particular industry shall be made low merely because at some particular time that industry is or claims to be unprosperous, is wholly inconsistent with the principle of a fair return upon which railway regulation is now based.

Many persons who have given much study and thought to the policy of basing the regulation of railway rates mainly or almost entirely on the principle of a fair return do not believe that this policy can ever be made to work. Their views are entitled to respect because they are based on indisputable facts regarding past developments. Our policy of regulation has been for years predicated almost entirely on this principle, and the principle never yet has been consistently carried out. With the possible exception of 1916 there never was a year from 1911, when the Interstate Commerce Commission decided the first important rate advance case, until government operation was adopted in which the railways earned a fair return; and there has not been a year since the Transportation Act went into effect when they have earned it. The Transportation Act expressly provides that the Interstate Commerce Commission "shall initiate, modify, establish or adjust" rates to enable the railways to earn a fair return, but words "*shall initiate*" seem to have been entirely overlooked by the commission.

It ought to be obvious to every reasonable person, that if the policy of regulating rates on the principle of a fair return is not to be conscientiously and consistently carried out, then the policy of regulation ostensibly based on that principle must be a failure and some other policy must have to be substituted for it. Apparently there are only two other policies available. One is that of having the government entirely abandon regulation of railway profits, and let the railways, like any other industry, earn what profits they can from rates fixed by themselves subject only to regulation to prevent rates from being made unfairly discriminatory. The other policy that might be substituted is government ownership. Persistent failure and refusal by regulating authorities consistently and fairly to carry out the policy of regulation required by existing laws must in the long run lead to the substitution of one of the other policies mentioned.

Get the Best Talent for the Special Job

A GREAT passenger station in a large city has been compared to an iceberg which exposes only one-tenth of its mass above the water's surface. What the passenger sees of the great station is purely superficial. He is afforded no opportunity to gain a conception of the enormously intricate but smooth working machine hidden entirely from his view. He knows nothing of the complexity of the structural frame enclosed within the marble and granite walls or of the involved mechanical and electrical utilities hidden in powerhouses and sub-basements or buried in conduits. He does not know of the large corps of trained experts who worked for many months on the design of these facilities, the selection of the appliances and equipment and the supervision of their

installation. Yet without the application of their skill a modern passenger station would be a cumbersome monstrosity.

The engineering staff for a union station project is entirely temporary in its nature. With the fulfillment of its work it is disbanded, which will happen within a short time in Chicago and soon after at St. Paul. It occurred not so long ago at Kansas City. What becomes of these highly trained men? Is full advantage taken of their training and experience on new projects evolved under the jurisdiction of railway managements foreign to those concerned in earlier projects? With few exceptions, no. It is a well-defined frailty of men to lean most heavily on those with whom they have had close personal contact, to develop their staff of assistants from among the members of their own organization, depending on native ability and character to compensate for the lack of specialized training. They are disinclined as a rule to look elsewhere for men of special knowledge.

This does not mean that a new project is undertaken in a haphazard fashion. Even though they lack specialized training the men assigned to such work are engineers thoroughly grounded in the fundamentals who realize that each step in the plan must be carefully considered with a thorough study of all the engineering problems involved and after a careful survey of previous installations. But profound engineering knowledge cannot take the place of specialized experience. Investigations of stations previously completed will show how the problem was solved in each instance but it will not disclose the details of the long process of investigation and elimination leading to the selection of the particular solution. It will not enable one to avoid the expensive errors which form an important part in the training of one employed throughout the duration of a construction project of a highly involved nature.

Successful execution of a monumental project such as the great union station gives rise not only to the application of many branches of engineering by men thoroughly trained in each specialty but also to the application of each of these to the peculiar problem encountered in station operation. In other words, a man must not only be a thoroughly trained structural engineer, sanitary engineer or power plant engineer, but he must also be enough of a railway engineer to appreciate fully the relation which each specialty bears to the project as a whole. Proficiency in service of this kind comes only after long experience which makes him more valuable in work of this particular nature than in other undertakings. Greater efforts should be made to retain the services of such men in developing a staff for new projects which give rise to such a diversity of engineering problems.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

First Railroad into Washington and Its Three Depots, by Washington Topham. Illustrated history of the pre-Union Station Terminals of the Baltimore & Ohio. 72 p. Reprint from Vol. 27, Records of Columbia Historical Society, Washington, D. C.

An Introduction to Economic Geography. Vol. I, Natural Environment as Related to Economic Life, by W. D. Jones, and D. S. Whittlesey. See "Railroads" in Index. 375 p., 366 figures (maps, charts, illustrations).

Pub. by Univ. of Chicago Press, Chicago. Price, \$5. *Moody's Analyses of Investments—Railroad Securities*. 1925. 1915 p. Pub. by Moody's Investors' Service, New York City. \$25.

New Zealand. Report of the Royal Commission on Inquiry into the Railway Service, Together with Copy of Commission and Addendum. Report and Recommendations Concerning Management, Facilities, Training of Staff, etc., by Sir Sam Fay and Sir Vincent Raven. 69 p. Pub. by W. A. Skinner, Govt. Printer, Wellington, N. Z.

Railway Statistics of the United States of America for the Year Ended December 31, 1924, prepared by Slason Thompson. 144 p. Pub. by Bureau of Railway News and Statistics, Chicago.

Twentieth Century Manual of Railway, Commercial and Wireless Telegraphy, by Frederic L. Meyer, 9th edition, revised. 287 p. Pub. by Rand, McNally & Co., Chicago and New York. \$1.50.

Periodical Articles

Air Transport Reliability, by Archibald Black. Relative efficiency of U. S. Air Mail and British Commercial Services. *Annalist*, Oct. 2, 1925, p. 411, 418.

Automatic Substation Equipment for South African Railways. Illustrated. *General Electric Review*, October, 1925, p. 713-719.

Signal Lighting—A Special Problem, by L. S. Dunham. Problems in design and construction of dependable signaling apparatus for railway service. *General Electric Review*, October, 1925, p. 689-691.

The Struggle for Cotton, by Evans Lewin. Location and possibilities of New Producing Areas, and, Pages 563-566, Railroads of Penetration Existing or Projected for These Areas. *Atlantic Monthly*, October, 1925, p. 560-567.

The Railroad Labor Institute of 1925, by B. M. Jewell. Purposes, courses, teachers, and students at session at Brookwood College in August. *American Federationist*, October, 1925, p. 935-938.

Taming the Railroads, by Garet Garrett. Second of series of articles. Discusses extension of Federal Regulation. *Saturday Evening Post*, October 10, 1925, p. 6-7, 48, 50-52.

What Better Transportation Has Done, by Charles S. Keith, Robert Lamont, E. M. Herr, A. R. Erskine, and Hale Holden. Business leaders and railroad official discuss results of efficiency in operation. *Nation's Business*, October, 1925, p. 40-42.

History of the Buffalo, Rochester & Pittsburgh Railway Company. Illustrated. *Shipper & Carrier*, Sept., 1925, p. 4-10, 53.

Railway Versus Truck—a Tug-of-War in Transportation, by Victor W. Knauth. How competition affects each of the competitors. *World's Work*, October, 1925, p. 664-668.

AT THE ANNUAL MEETING of the American Association of Freight Traffic Officers held in New York on September 21, the following officers were elected: president, F. B. Houghton, freight traffic manager of the Atchison, Topeka & Santa Fe at Chicago; first vice-president, W. A. Terry, freight traffic manager of the New York Central at Chicago; second vice-president, Archibald Fries, vice-president of the Baltimore & Ohio at Baltimore, Md.; third vice-president, Charles Barham, chairman of the Southern Freight Association at Atlanta, Ga.; fourth vice-president, E. R. Oliver, vice-president of the Southern at Washington, D. C.; and secretary-treasurer, J. D. Gowin, assistant general agent of the Missouri Pacific, the Gulf Coast Lines and the International-Great Northern at Chicago.

Letters to the Editor

A Modified Potter Plan

NEW YORK CITY

TO THE EDITOR:

Would a modified "Potter Plan," applied to all railroads, be less onerous than the present recapture provisions of Section 15a of the Interstate Commerce Act, and the possible compulsory consolidation provisions now said to be favored in high political circles?

The recapture clause now provides that one-half of the net earnings in excess of six per cent of a railroad's value shall be paid into a government revolving fund. This fund may be used only for making loans to (weak) roads at six per cent interest or for the purchase of equipment to be leased to (weak) roads at six per cent. This clause was written into the act to prevent "prosperous" roads from retaining large earnings from a system of rates adjusted to the needs of the average road.

This provision appears to be predicated upon the theory that money-making ability is something for which to be punished,—is criminal. No one is benefited by the provision. With or without recapture, rates would be adjusted to the needs of the average roads, and, with or without recapture, rates would be the same. The "government" does not benefit, for recaptured earnings may only be used as provided in the Act and may not be used to help meet government expenses nor to reduce taxes. "Weak" roads are not benefited, for a road that is so poor that it cannot borrow money or purchase equipment at less than six per cent cannot be materially helped by adding six per cent obligations to its capitalization. The net result is that no one is benefited. Instead, roads that are so wisely located or managed that they can earn in excess of six per cent on their value are penalized merely because they do have earning ability. Earning ability and efficient management are not crimes and certainly do not warrant punishment. They should be encouraged. Destruction of earning power and discouragement of efficient management will make necessary higher rates.

The Interstate Commerce Act states that, under a system of rates adjusted to average roads, certain roads will earn less than a fair return and certain will earn more than a fair return. Recapture of excess earnings is suggested (in the Act) as a means of remedying this condition by evening up the earnings of the various roads. That is no remedy at all. If this condition must be "remedied" (and Congress apparently intends that it should be), the formation of "revenue pools" for the roads in the various rate groups, based on the Potter Plan, appear to be a more satisfactory method.

Among the points to be considered are:

1. The present recapture provision discourages efficient management and encourages extravagant expenses on the part of the prosperous roads (to avoid recapture) and benefits no one.
2. "Weak" roads (that are necessary to the nation) must be permitted to live and to furnish satisfactory service.
3. No restriction of incentive to efficient management should be permitted.
4. No encouragement should be given to extravagant expenses.
5. Rates should be fixed at the lowest point which will furnish a satisfactory return to the railroads.

6. The workings of any plan (especially the accounting features), should be as simple as possible.

Consider an amendment to the Interstate Commerce Act, replacing the recapture clause and providing

- a. That an assessment of 5 per cent of the gross of the roads in each rate group be paid into a pool, and
- b. That from this pool money be paid to such roads as fail to earn a fair return on their value, in amounts equal to one-half of the proportion that their deficit below a fair return bears to the deficit of all roads earning a deficit, below a fair return, and
- c. That funds in the pool in excess of the requirements of provision "b" be returned to the contributing roads in proportion to their contributions, and
- d. That if the five per cent assessment be not sufficient to meet the requirements of provision "b," the payments under provision "b" be reduced proportionately.

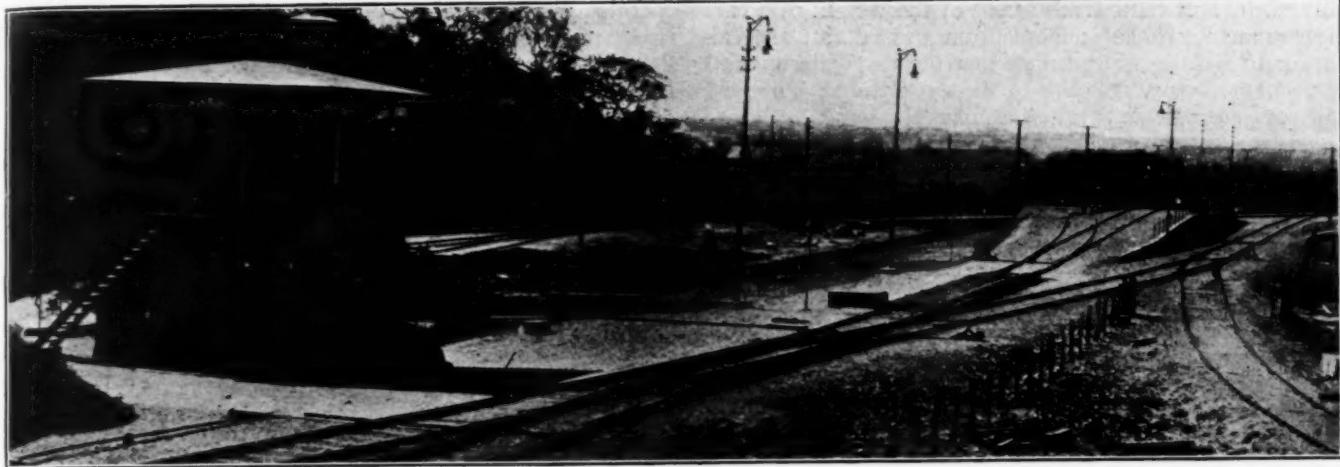
This plan is not a taking from "them that hath" merely for the taking, as the recapture plan is. It is an assessment against all for the benefit of all that fail to earn a fair return. It is in the nature of "hard times" insurance. The road that is up now may be down tomorrow and vice versa. Under such a plan both the roads that are up and those that are down would be able to carry on and to serve their communities. However, it might be necessary to make some special provision for, or to abandon entirely, chronic beneficiaries of the pool, which could not under any circumstances unaided earn a fair return.

This plan would not discourage efficient management, for the roads would retain all their earnings after contributing to the pool of five per cent of their gross revenue. No road would be required to contribute part of its net to the government and all net that a road could make from its gross (after the assessment) would be retained by that road. The weak roads would be benefited by their receipts from the pool. No extravagant expenditures (for maintenance or otherwise) on the part of the prosperous roads (which, presumably are already well maintained) would be encouraged. There might be an encouragement to too heavy expenses on the part of the weak roads, but this tendency is counteracted by the provision that the weak roads may not receive from the pool more than one-half their deficit below a fair return. A weak road would earn more money by increasing its operating income than by letting it lag and receiving help from the pool. What encouragement to "over maintenance" there is, is transferred to the weak roads where "over maintenance" would probably be more needed. Rates could be lower and service could be better under this plan than under the present system, for the weak roads would be able to carry on under a system of rates that would otherwise bankrupt or financially embarrass them.

The accounting provisions of this plan are not simple but neither are those for recapture. The valuations of most of the roads have not been determined and unless ad interim valuations could be agreed upon, the plan is not workable until final valuations have been ascertained. Another objectionable feature is the difficulty of determining just what "net operating income" is. It would be necessary to "police" the accounts of all roads making claims against the pool, which would involve a greater number of carriers than are now examined under the recapture provision. The question is, would the benefits from "revenue pools" outweigh the objections?

I believe that the recapture provision is not only a useless but a harmful addition to the Interstate Commerce Act, and that it should be replaced with a plan which would actually accomplish what recapture was supposedly intended to accomplish. The foregoing suggestion may offer a possible alternative.

R. E. THOMPSON.

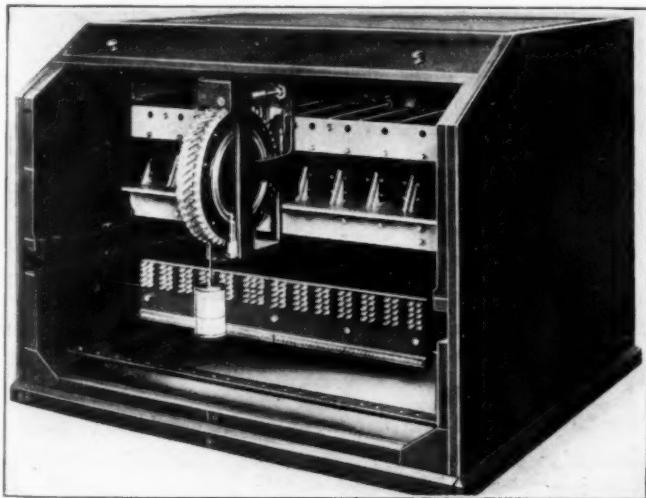


The Hump, the Rail Brake and the Tower in the Yard at Aarhus, Denmark

Car Retarders Used in Europe

*Installations operated by hydraulic pressure are in service
in Germany, Sweden and Denmark*

A SYSTEM of rail brakes or car retarders for automatically controlling the speed of cars in hump yard switching has been developed in Germany and was first installed at Oberhausen in 1918. Other installations have been made during the last three years at Cologne, Seddin, Schwelgren and at several other important yards on the German State Railways. This system, which is known as the Froelich hydraulic system, has



Automatic Switch Control Box with the Collector in Place

also been installed at Aarhus, Denmark, and Susteren, Holland. The illustrations show the apparatus installed at Aarhus.

The design of the apparatus employed, to which the term rail brakes is applied, is based on the invention of Dr. Froelich, railway superintendent to the German Government. The W. Dederich, Ltd., London, England, holds the right for the sale and installation of the Froelich hydraulic system in all parts of the world except Germany. The purpose of the system is to eliminate the necessity for employing car riders—a brakeman on each cut of cars.

The manual braking of cars on humps is in many cases unsatisfactory, resulting in damage to cars and lading and also in serious injury to employees, especially in stormy weather.*

In the Froelich system a long brake shoe made of a rail,



Rail Brake as Installed at Aarhus, Denmark

lying along each side of the running rail of the track, is operated by hydraulic pressure to bear against the flanges of passing car wheels. The operator in the tower, being

*The economic aspect of car retarder systems was described in detail in connection with two articles concerning car retarders installed on the Indiana Harbor Belt Line at Gibson, Ind., published in the *Railway Age* of Nov. 15, 1924, page 895, and May 9, 1925, page 1143. A brief description of the Froelich apparatus was given in the *Railway Age* of December 6, 1924, page 1038.

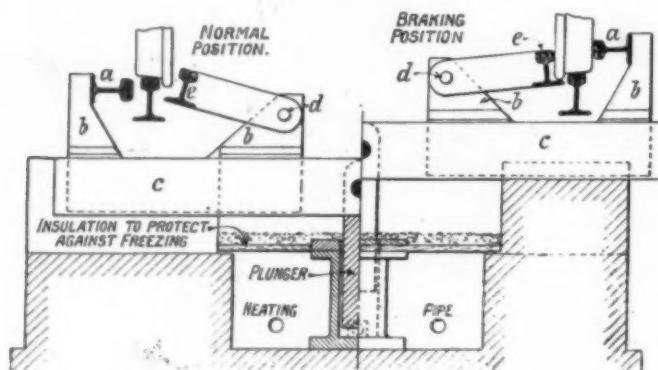
informed by automatic track scales of the weight of a car, can estimate its probable momentum and operate the car retarder to reduce the speed so that the car will run into the proper track and come to a stop without bumping other cars so hard as to cause damage.

Weight of Car Effects Braking Automatically

In the mechanisms first devised in Germany the bearing blocks were primarily raised and depressed mechanically, every subsequent operation being carried out by hydraulic power. In later installations, such as that at Seddin, the entire movement is operated hydraulically. Another unique feature of this system is that the weight of the car automatically establishes and controls the braking effect while the car is passing through the car retarder.

These brake rails *a* (see diagram) are mounted on the brackets *b*, which latter rest with a sliding contact on the vertically adjustable bearing blocks or supporting beams *c*, those on the inner side carrying the inside brake rails *e* pivoted at *d* on brackets *b*. With these in the elevated position the wheels of the train run with their flanges bearing on the base of the brake rails *e*, forcing the latter downward, and hence each pair of brake rails presses against the lateral surface of the wheels or tire sides so that the more the bearing blocks are forced upward the greater this pressure becomes. Lack of uniformity in the thickness of the wheels has little effect on the action of the rail brakes. The number of axles, also, has no influence on the braking efficiency, which does not, as in the case of hand braking, fall as the number of axles increases.

A determining factor in the force of braking is the weight of the car itself. The apparatus is generally designed so as to make the pressure against the wheel four times that of the hydraulic pressure. The latter is regulated by a valve which holds the pressure automatically, the pointers indicating the exact point at which the wheels



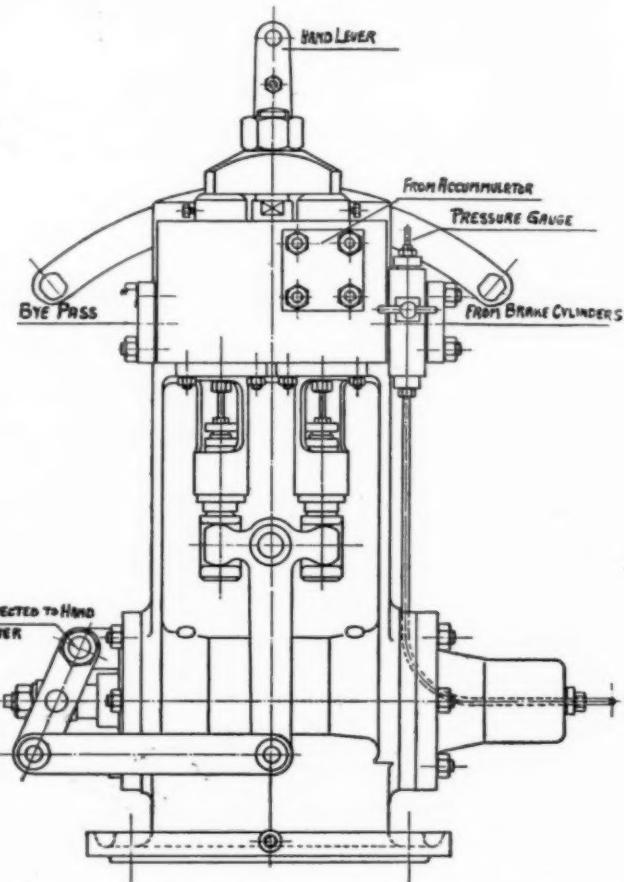
Section of Rail Brake Apparatus

(a) Brake-Rails, (b) Brackets, (c) Supporting Beam, (d) Pivots, (e) Inside Braking Rail.

enter the brake, thereby sending up the pressure which is instantaneously reduced to the predetermined maximum allowed by the valve. If the operator, through lack of skill, employs too high a pressure, the car is simply lifted off the track by a fraction of an inch and the excess hydraulic pressure is taken up by the automatically-acting compensating device, which is set to function at a given pressure. Although rarely occurring in actual practice, and only because of gross negligence on the part of the operator, it can happen in this way that the braking effect will be reduced automatically to zero at the instant the car begins to climb, i.e., to leave the foot of the inner brake rail. In this manner the valve merely maintains under all conditions the maximum hydraulic brake pressure which is determined by the position of the hand lever in the

operator's cabin. From this it follows that violent braking is out of the question. With this feature, combined with the permanently parallel position of the brake rails, there is no possibility of derailment.

From the foregoing it will be understood that a given hydraulic pressure corresponds to a certain rail brake pressure, which in its turn is dependent on the axle loads, and is also governed by a special automatic by-pass device. The correlation between these two pressures has been utilized to compile the figures for varying weather con-



Valve Assembly Unit Which Controls the Hydraulic Pressure

ditions, as a certain pressure always corresponds to certain work. From this, a scale has been prepared which is fitted on the lever quadrant, indicating the exact position of the lever to enable the operator to apply the requisite amount of braking force if he knows the weight of the car and the distance it has to run.

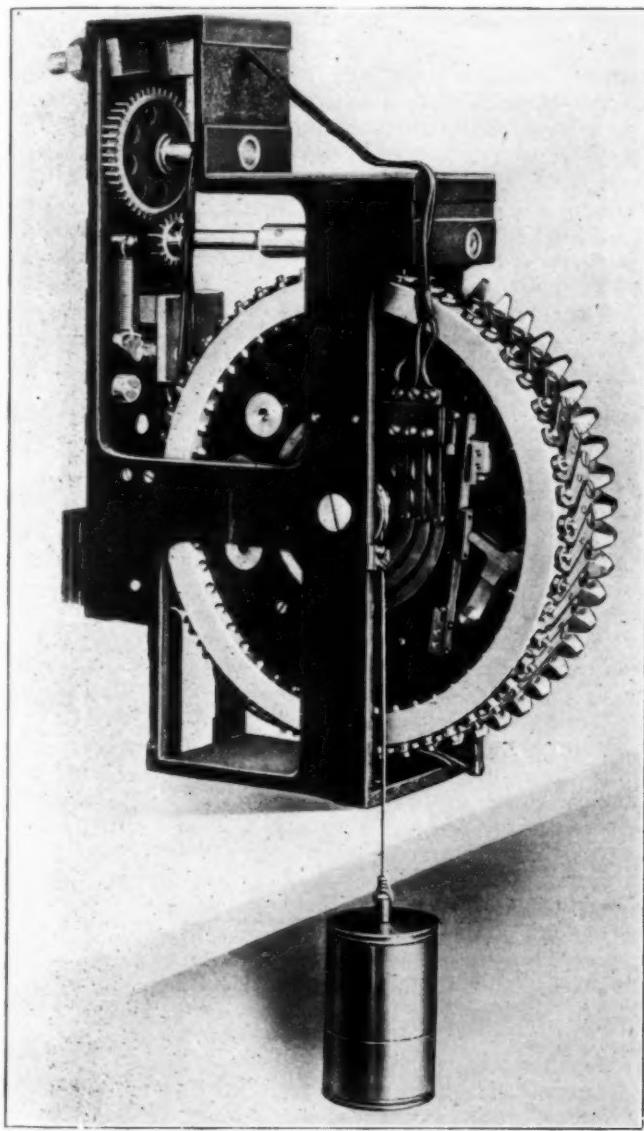
How the Operator is Informed of the Weight of a Car

In order to inform the operator of the weight of the car a special weighing device has been devised. This records the axle loads in four different steps and transmits the information to an indicator board (placed within sight of the operator), just before the car enters the brake and while it remains therein. In this way the operator sees the weight of each car before applying the brake. He knows into which track the car is to run, and he can also see what cars are already in each one, so that he is in a position to determine the braking effect required in accordance with the scale given in the table already mentioned. Practice enables the operator to judge to a nicety the amount of brake force to be applied to the cars so as to give them just enough impetus to reach the last preceding car without bumping against it.

After a little practice he becomes expert in his work

and is independent of the table, this latter finally representing nothing more to him than a means of making rough adjustments. He will then rely preferably on his own observation of the behavior of the car, before and after braking, to gage the lever manipulation required to bring about the desired result. The brake is released by dropping the transverse members.

The hydraulic power is supplied by a plant of any approved design and is required solely for raising the brake initially, for making up by-pass losses, and for otherwise furnishing additional pressure when needed.



The Collector Drum Controls the Operation of the Switches

In order to obviate the risk of the water in the hydraulic system freezing in severe weather the pipes outside the control station are embedded a sufficient depth to prevent the penetration of frost, while heat is supplied to the braking conduit, this heat being derived from the same source as that which supplies the heating requirements of the control station or switchman's cabin. The water is supplied by a compressor pump driven by an electric motor and collected in a hydraulically-controlled reservoir, suitable valves actuated by a simple lever regulating the water level.

The use of well designed rail brakes in hump yards enables a considerable saving to be effected in personnel, in the wear and tear of rolling stock, and also as regards reliability and the expeditious handling of trains. In order

to obtain the best results it is desirable that the working of the switches and that of the brake should be under the same control, thus eliminating disadvantages arising through several switchmen having to work strictly in accord with each other's movements. Apart from the fact that the brake operator and the switchman work to the same instructions and have to make the same observations, the work of the one is interdependent with the work of the other, especially if irregularities should occur in the passage of the cars over the hump. Unskillful braking may interfere with the movement of the switches. Changes in the destination of the cars (into a track other than that originally intended) may call for a different brake application. Further, provision has to be made for the carrying out of operations in foggy weather.

A system of power switch machines has been designed



The Master Control Unit Located in the Tower

and is being used in Germany in conjunction with the Froelich rail system. This is the collector drum system of the General Electric Company (England). It is distinguished from others used for switch operation through having not only one, but as many as 50 contacts, mounted on a common drum corresponding to 50 different point positions for as many switching tracks leading from the hump. The manipulation of a lever actuates one contact and simultaneously turns the drum mechanically, so that at the next lever movement the contact next following is brought into action.

Concentrically inside the contact drum, but rotating independently of it, is another drum carrying a magnet which is supplied with current from an insulated rail placed in front of the rail brake, or it may be controlled from a rail contact. This magnet prepares the connecting-up of the contacts which, however, only takes place after the car has left the insulated rail. In passing off the car releases the magnet and allows the inner drum to establish contact with the next position. In this manner the switching program for 50 cars, or cuts of cars, can be collectively set in advance on any one track by means of a single controlling mechanism, and shifted in rotation

as the cars descend the hump. This feature renders the operation independent as regards the time required for a car to run down the hump. The automatic switch box with the "collector" in position, is shown in one of the illustrations. It will be understood that the controlling device enables each cut of cars to shift the switches for its successor. Through this collective setting of all the switches in advance by one mechanical operation the amount of work to be done is materially reduced, and can, in fact, be carried out by one man. A pointer advances automatically down the list of cars of which the train is composed, and shows the switchman at any moment exactly how far the work has progressed and which car is passing at the time. Another pointer on the opposite side indicates automatically for how many cars or cuts of cars the switches have been shifted in advance. As soon as the two meet the collector is "empty", so to speak, and ready to receive switch positions for another 50 cars. A bell rings when the third car from the last passes through the first switch on its run, or in case of a fault in the control circuit.

To provide for cases where it becomes necessary to interfere with the anticipated setting of the switches, or where the instructions as to the destination of certain cars are changed while the switching is in progress, the operator is provided with a diagrammatic view of the track. On this board the switches are provided with buttons and with small lamps which are included in the track circuit and which glow as long as a car is on the insulated rail. By pressing these buttons it is possible to change the switch positions which had previously been selected for the collector. By means of a special switch all contacts in the collector drum can be put back into neutral. In this way emergencies have been provided for. With the small lamps on the track plan the operation of the hump yards is facilitated under unfavorable weather conditions. Thus, the passage of the cars into the classification tracks is, in the first place, indicated by the advance of the pointer on the list of cars in front of the switchman, and checked for a second time by the glowing of the lamps on the board as the car reaches the first switch on its run. Finally the switchman can throw each switch by hand, if he so desires, without impeding the accurate functioning of the switch boxes, the collector or the drums. The latter are independent of each other, and for this reason, though one or the other may get out of order, the complete plant can never do so.

Example of Yard Operation

The following example will show how a certain classification yard is being operated mechanically by centralized control. The drawing represents the type of gravity yard having level receiving tracks. Track and profile plans, as well as the position of the rail brakes, have been made as nearly correct theoretically as local conditions permit. Accordingly four rail brakes 65 ft. in length each were thought desirable for reasons of reliability. Over 4,000 cars had to be classified daily and if four brakes were installed the failure of one would be felt less than if a smaller number were used. Besides, a multiplicity of brakes is conducive to a better development of the layout of the switches and the attainment of "a short braking zone". Just below the summit of the hump two rail brakes 11 ft. 6 in. long have been installed. These are called summit, or primary, brakes, and serve the purpose of retarding a car temporarily, but the braking effort may be made such as to bring the whole train to a standstill. The operator faces the hump and has on either side of him one common valve for the summit brakes. The same room overlooking the sorting sidings accommodates the control switches, and the apparatus for working and

supervising the switching as described above. A loud speaker has been arranged which communicates with the men at the hump summit and at the entrance to the classification tracks. Finally, a button for sounding horns between the sidings, and a lever for giving signals to the engineman, have been conveniently arranged.

The mechanism for throwing the switches is installed on the floor below, and the power plant is in the basement. For the sake of reliability both pumps and motors are provided in duplicate, one being electrically, and the other gasoline driven. If the electric current should fail both motors can drive one pump or the other as may be required. The highest possible degree of working reliability has been attained, as the brake valves can be replaced within a minute or two. The operator's cabin and the rail brakes are centrally heated from the basement. Apart from the brake operator and the switchmen, one man is needed to uncouple the cars at the summit of the hump, and one man for each five to eight classification tracks. One of these men has to remain in the vicinity of the loud speaker and the others are stationed at various points throughout the yard.

Plan for Northwestern Rate Advance to Be Presented

WASHINGTON, D. C.

CHAIRMAN Aitchison of the Interstate Commerce Commission has advised William Church Osborn and Grenville Clark, counsel for security holders in the Northwestern region, that they may present evidence on a plan for an equalization in rates between the Northwestern region and the remainder of the Western district, at the early part of the hearing in the western rate case to begin in Chicago on October 26. The Commission made public a letter from Messrs. Osborn and Clark as follows:

"During the hearing of the Western rate case held in Chicago in September, the subject of the depression in freight rates in the Northwestern region was alluded to by several witnesses, but no adequate statistical proof was offered on that point. As counsel for the security holders in the Northwestern region, we have caused to be made a careful comparison between the rates in the Western Trunk Line territory and in the rest of the Western district. This study is based on authentic data already in evidence before the commissioner and really forms a most important contribution to the inquiry which you are conducting. Indeed, we have no hesitation in saying that the inquiry cannot be considered complete without testimony of this or a corresponding nature being had."

"During the course of the inquiry, the Chairman asked several witnesses in substance whether they had a plan to cure the alleged depression in rates in the Northwestern region and if so, what that plan was. Our examination of the testimony does not reveal that any adequate reply was given to this question. On behalf of the security holders, we have caused to be prepared a plan covering the situation which is consonant with the methods of the Commission in other cases and which will result in a satisfactory equalization of rates between the Northwestern region and the remainder of the Western district."

"We now ask leave of the Commission to submit the evidence of the comparison of rates and the proposed plan at the hearing to begin at Chicago on October 26th and following the testimony of Mr. Baldwin of the Missouri Pacific, if that course is agreeable to the Commission."

A committee of executives of the western roads held a conference with members of the Interstate Commerce Commission regarding the rate case on October 20.

Western Railway Club Discusses Supply Question

Fallacies of compromising specifications aired at well attended meeting—Better co-operation urged

A CONDEMNATION of the "prevailing practices" on railroads of compromising specifications for price reductions, together with an emphatic endorsement of "simplified practice" and a plea for better co-operation with the stores department, coupled with a warning to users of their responsibility for investment in unapplied materials were among the key-notes that marked the proceedings of a Western Railway Club meeting on October 17, at the Sherman hotel. This meeting, the first technical session of the season, was devoted to the subject of railway materials and supplies. The speakers were: Frank D. Reed, vice-president and general purchasing agent, Chicago, Rock Island & Pacific, who, in presenting the purchasing viewpoint, outlined the pur-

chasing and stores operations on the Rock Island; J. G. Stuart, general storekeeper, Chicago, Burlington & Quincy, who developed the relationship of the stores department to the other departments; and A. G. Trumbull, chief mechanical engineer of the Erie, who developed the user's viewpoint. The meeting, which was one of the best attended regular meetings in the history of the club, with approximately 300 members and guests present, was preceded by a luncheon, the feature of which was the presentation to W. F. Thiehoff, president of the club, of a traveling bag as a token of the esteem of the membership and in recognition of his services in securing the greatest number of new members. The papers are abstracted as follows:

Problems and Needs of Store Departments

By J. G. Stuart
General Storekeeper, Chicago, Burlington & Quincy, Chicago

A railroad is, in many respects, like an army. It is the infantry that is holding the line or making the advance; the artillery that is preparing the way by shelling the enemy; the aviators that are scouting overhead. But, back of the infantry and the artillery, are the ordnance and commissary departments bringing forward ammunition, food and the other supplies without which victory is never won. Yet the ordnance and commissary departments are seldom mentioned in the dispatches and then, as a usual thing, only when there has been a failure.

Similarly on a railroad there are the operating and the mechanical departments that keep the trains moving. But, back of the operating department and back of the mechanical department; in fact, back of all the departments, are the purchasing and store departments, sending up the supplies without which a railroad could not operate. Yet the purchasing and stores departments are constantly working in the background and are seldom heard of except in case of a failure.

Napoleon once said that an army traveled on its stomach. In like manner it can be said that a railroad runs on its supplies.

The store department is created in order that it may specialize in the furnishing of material. It does not repair cars; it does not run trains; it does not maintain track. Its main service is to serve the others. The store department is a department of service and not a department of economy, although it is the duty of the store department, as well as that of every other department, to give the service required of it at the lowest possible cost in payroll and investment.

Distribution the Least of Stores Problems

Distribution of supplies, in the narrow sense of the word, is not now a problem of the store department. The real problem today and in the future is in getting supplies to distribute. To get the supplies in the proper quanti-

ties and have them when needed is the real difficulty of the storekeeper.

There is a great difference between the one who uses the material and the one who provides it. The user is always thinking in the present, what he wants today. The provider is always thinking in the future. Today he is thinking and planning for what he will need to take care of the men depending upon him for supplies two, three, four or five months hence. He must in some way visualize or sense the future. He must anticipate needs.

In the past few years storekeeping methods have been improved and the work so systematized that a great deal of it seems to be mechanical but, regardless of the improvements that have been made, the fact remains that the real part of storekeeping cannot be seen. It is still the man, rather than the methods, that brings the proper results.

To order stock properly several months in advance of the time it is to be used the storekeeper must have accurate data on the past consumption of the items he is ordering. He must have the best information obtainable of any work to be done that is at all out of the ordinary. He must know, if possible, of any changes in working conditions. He must consider the nature of the material he is ordering and whether or not it is an article that will be used to a greater or lesser extent in the season that is approaching.

Cooperation Essential to Results

There is another great difference between the provider and user of material. The provider, several months in advance, must furnish the purchasing agent with orders for a definite amount of the material required. With the user it is entirely different. He is not bound or limited in any way. The storekeeper's problem is to order a definite amount for a future indefinite need. There is a

great opportunity for co-operation in the ordering of material. A little discussing with the storekeeper in advance will save cussing at the storekeeper later.

The user of material expects a storekeeper to have a general knowledge of the way the material is used; also to have some understanding of the conditions under which it is used. It is just as important that the user should have some general understanding of some of the phases of storekeeping. A better understanding of the conditions under which the storekeeper is working will enable the user to be more helpful to him and in some cases perhaps a little more charitable. A little more of the "we" and less of the "I" will accomplish a great deal.

The user of material is anxious to get his best production and, though he may not realize it at first, he will understand after a short time that the storekeeper is really the best helper he can get on production work. The prompt supplying by the storekeeper of the material needed is what will really enable the user to increase his output. The storekeeper, to a very large extent, is judged

by the investment he is carrying. The investment is something that the user does not seem to care much about and yet it is something he is going to care more about in the future.

In every stock there are a number of what might be termed "dead" or "slow-moving" items. If the user and the provider are working together, they can dispose of a great deal of this slow-moving material and put in its place items that would be a great deal more useful to the user. Substitution is the method of disposing of dead stock, but substitution is not generally liked. But, if the investment is to be kept down, these items must be used and if the user expects to have a good supply of essential items he must do his part to dispose of these slow-moving or dead items.

It should be borne in mind that the success of the railroad as a whole is the objective and not the success of any one department. There is room for improvement along the line of co-operation and the sooner this improvement is made the better it will be for the railroads.

The Requirements of the User

By A. G. Trumbull
Chief Mechanical Engineer, Erie, New York

Material, like every other matter that requires departmental specialization, is bound to be considered mainly from a departmental viewpoint. This naturally results as accuracy is gained in knowledge of the requirements to be satisfied or of the properties of materials available to meet those requirements. It will not be denied, however, that from acquisition to final application, material should be regarded only in the light, not of cost, but of service value. It is worth the best efforts and attention of all departmental officers to foster and promote this highly desirable purpose, especially so when we reflect upon the great sums involved in purchase and the consequences of mistakes in choice for specific uses.

The advancement of knowledge in every direction ought to guide us in all respects where the settled conclusions of scientific research have paved the way to improved practices. Not only has there been a natural development in the scientific application of materials to definite purposes but research and investigation have been generally stimulated by the continued high cost of all classes of labor and by the steadily mounting operating costs of all manners of industrial enterprises. In the railroad field the use of materials for definite purposes as, for example, a highly refined iron for staybolts, has developed gradually; consequently, precedent has naturally been the dominating influence due not so much to lack either of vision or initiative, as to the limitations imposed by the cost of research and the expense involved in investigations, the results of which it may be impossible to predict in dollars and cents. Fortunately, however, developments in other fields have partially blazed the way for us and have made a considerable volume of research material available not only in the metallurgy of iron and steel but of the non-ferrous metals as well.

The Automobile Responsible for Intensive Study of Materials

The automobile is probably responsible for a more intensive study of the adaptation of materials to definite mechanical purposes than any other single agency and the researches of the automotive engineers coupled with the sympathetic co-operation of producer and user should greatly improve the service rendered by various ma-

terials, increase the life of important structures, lower capital investments by reducing the number of units owned and maintained and lower operating costs by reducing the number of equipment failures and by increasing the per diem use of equipment of all kinds.

The automobile industry early recognized that the extent of its development depended upon a product which could be operated continuously and attain a long mileage life without mechanical failure, either of the structural or working parts. The railroads, however, have in general accepted failures as a necessary part of their maintenance problem and until comparatively recently the subject has received little intensive study.

On most railroads, specifications for steel are confined to material for:

Axles and crank pins	Structural shapes
Castings	Tires
Plates	Wheels

With few exceptions no heat treatment of any kind is specified, even for those parts subjected to the greatest stress in the most varying degree. On the other hand, the standards of the automobile industry cover:

- 6 specifications for carbon steels
- 20 specifications for nickel chromium steel
- 7 specifications for chromium steel
- 8 specifications for chromium-vanadium steel and
- 2 specifications for silico-manganese steel

In addition to this 17 different heat treatments are prescribed for the different steels and these are subject to modification to suit the varying properties of each of the different kinds. The heat treatments themselves involve as many as seven different operations. The automobile industry has left the railroads behind in the matter of adapting steel to its greatest usefulness for specific purposes.

As a single example consider the influence of heat treatment upon carbon steels. This is well illustrated by a spring steel having 0.95 carbon. The tensile strength of this steel will vary from 95,000 to 125,000 lb. with a corresponding yield-point of 60,000 to 90,000 lb. depending upon the temperature to which it is reheated. Thus the value of the material is increased practically 50 per cent by a manipulation, the cost of which represents a small proportion of the total cost of the finished product.

These considerations also serve to direct attention to the practice of many railroads in the reclamation of materials, particularly iron and steel. It is the general custom to rework various parts for conversion to others of smaller dimensions for purposes similar to or diverse from the original. The most common of these processes involves the forging of locomotive axles into smaller axles, piston rods, crank pins and other similar parts. In most instances, these axles are subjected to the most violent treatment at varying temperatures and the rough forging is finally produced at a relatively low heat and left to cool before machining without further treatment. It is true that the failure in service of parts forged in this manner are not usually sufficiently numerous to direct attention to the cause but they are responsible for many locomotive detentions and the number detected by vigilant inspection is large.

The re-working of steel axles and other parts undoubtedly would produce substantial economies if performed under proper temperature control and if the parts so forged were subjected to appropriate heat treatment. These observations have been confined to carbon steel only as it is presumed that the use of alloy steels would not be considered in the absence of suitable heat treatment.

Increased Use of Alloy Steels Due to Heat Treatment

While the use of alloy steels owes its great advance to the remarkable increase in their physical properties resulting from definite heat treatment, the resistance to oxidation offered by certain alloys has opened a wide field for the extended use of such steels. If, as experience appears to indicate, a copperized carbon steel will increase the service life of steel cars approximately 60 per cent, there is reason to anticipate a similar extended life for many other parts now subject to serious deterioration through the influence of adverse atmospheric or water conditions. Experiments now in progress should prove the value of special steels for boiler construction at an early date.

This brief discussion would be incomplete without some reference to the increasing interest in the use of steel for staybolts.

If a material having a ductility represented by a reduction in area of 65 per cent can be made available there is reason to anticipate that it will gradually supplement the highly refined iron, which has so long been the universal standard for staybolts in this country. The advent of the electric steel furnace will probably insure a uniformity of product that will remove the only apparent obstacle to the extended use of steel staybolts.

With the limitation in the use of materials that naturally follows the restrictions in application necessary to the attainment of maximum service value, the difficulties in requisitioning, storing and purchasing are multiplied. Quality, according to given conditions, is a prime essential to economical application and a knowledge of both is an indispensable preliminary to purchase. The purchasing officer is frequently blamed for supplying unsuitable materials when he has not been properly informed as to the requirements and has not been fully advised concerning the results obtained from materials under varying service conditions. The remedy for this situation is to purchase as far as practicable to specifications. It is true that certain well-known brands have an established standard of quality but on the other hand advertising may falsely make a label such a standard. Moreover, a specification based upon accurate knowledge of the requirements of the use to which the material is to be applied, not only favors healthy competition and opens the avenues for improved quality of service but at the same time

greatly simplifies the problem of purchase, storage and use.

Specifications Unenforced Are Worse Than Useless

However, specifications that are not enforced are worse than useless and create unfair competition. It is a regrettable fact too, that vendors frequently take advantage of a prevailing practice to accept goods not up to specification on a price reduction. This practice not only stultifies the purchaser but it is unjust to the great majority of vendors whose high ideals of business ethics do not admit of such practices.

Closely allied to specification buying and in many cases preceding the specifications is the matter of standardization. I am not unmindful of all the objections urged against such a policy by those who fear it may prove detrimental to private interests engaged in furnishing a variety of appliances and appurtenances for use on railroad equipment, but the fears of those interests and of others prominently voicing the objections are due to a misconception of the purposes sought. Perhaps an unfortunate choice has been made of a descriptive term and the words "simplified practice" would convey less of an apparent threat to the private interests concerned and more of the object in view. Certain it is that no justification can be found for the want even of constructive effort in this direction. The advantages and business economy of standardization are too well known to require any discussion except to say that in this important particular every interest of the transportation business has a clear right to look with insistent expectancy upon the consuming departments for constructive action.

A Word in Favor of Standardization

It is pertinent at this point to say a word favorable to a proposition not new but looking forward to the influence of some standardizing agency operating under the auspices of the American Railway Association which will have authority, and exercise it, to effect the adoption of simplified practice in the application and use of parts of equipment and other appliances common to all railroads which are susceptible of reduction to a uniform design. This can be accomplished with no damage except perhaps to that selfish pride of authorship which all too frequently bars the way to progress in any direction. The responsiveness of various industries to the standardization program of the Department of Commerce is a revelation of the possibilities of such nation-wide activities and it would appear to be much to our credit to emulate so good an example. Nor does it require even a minor prophet to foresee that a matter so closely related to costs and having such demonstrable potentialities for substantial reductions in railroad operating expenses may ultimately be induced by external agencies if not rationally and constructively undertaken by the railroads themselves.

There is one other aspect of the material situation applying more particularly to purchase and use that can be brought out by illustration. For many years a certain railroad had purchased its valve oil for power house purposes from the A. B. C. Oil Company. Based on all the information available to the mechanical department the oil satisfied every reasonable standard of excellence in a product of its kind. In the course of time, a young man representing the X. Y. Z. Oil Company appeared, who desired to interest the railroad in valve oil for power house use. His goods were high grade, but no claims of extraordinary merit were made. He acknowledged that his competitors were selling a high grade product also but he was satisfied that his own was at least the equal of it. He had taken the liberty, however, of calling at the power house the previous afternoon and was satisfied

that he could not only produce the same quality of lubrication but could do it for less money. He was prepared to conduct a test and if he failed to satisfactorily lubricate the engines and save 30 per cent in the cost of lubrication his company would render a no-charge invoice.

The test was conducted and the report disclosed that the young man had more than satisfied his part of the contract—he had lubricated the engines satisfactorily and the figures indicated a saving not of 30 but of 50 per cent. A little skilful questioning developed however that before beginning the test the salesman had carefully adjusted the lubricators so that only half the former quantity of oil was being fed to the cylinders. This is represented as a true story taken from a book written for the education of purchasing agents as an example of the shady kind of business enterprise against which all forward looking purchasing agents should ever be on the alert.

But this is not the impression that was conveyed to me.

The two salesmen were not selling the same thing. It is true that all the chemical and physical tests that could be applied failed to detect any difference, but there was one just the same. The new salesmen knew all about his oil because his company through its researches had investigated its properties and had imparted the knowl-

edge to the salesman. He knew that his oil would provide adequate lubrication and he knew how much was required to do it. That information had a value aside from the oil itself. It cost money to obtain it and it was appropriate that this cost should be added to price of the oil to the consumer to whose profit the information substantially contributed.

The story emphasizes one element of the cost of materials that is sometimes overlooked by all departments concerned in their purchase, storage and use. Probably every mechanical device, if, indeed, not most articles of railroad use, require a long period of study, experimentation and development before they can be considered a commercial success. All this is expensive and the cost must be borne by the consumer. That is why a comparison with a like quantity of finished materials of the same class reveals a disproportion in cost and it is the best answer to the argument that "purchasing consists of exchanging dollars for commodities." It really should consist in exchanging dollars for service and it can be accomplished only when there is a common and sympathetic understanding between all departments which alone will assure a continuous flow of necessary materials, maintain a live and active stock and hold the investment at the lowest point consistent with the demands of the service.

The Purchase of Materials and Supplies

By Frank D. Reed

Vice-President and General Purchasing Agent, Chicago, Rock Island & Pacific, Chicago

The purchasing department on a railroad is the real foundation of the organization, since it is required to provide the material necessary to the operation and upkeep of the property. In order that the purchasing agent may do this successfully, it is absolutely necessary to have complete information from all departments on the railroad as to their requirements.

On the Rock Island, where methods are, in a general way, similar to those of other roads, the various departments must first agree on standards for all purposes. These specifications, covering the numerous items of material, are prepared by the head of the department; the chief engineer preparing the specifications for all material used in the roadway and engineering department, and the general superintendent of motive power, for all material pertaining to the motive power department, the engineer of tests, collaborating in this work. These specifications are complete and clearly indicate the kind of material that is to be used in the manufacture of the various items they cover.

Specifications Important

In many instances these specifications conform to the standard specifications of recognized manufacturers, which is an advantage to the railroad in making purchases, as it permits the securing of material from responsible manufacturers at reasonable cost. When standard specifications have been established and approved, no material is purchased that does not conform to these specifications, except material desired for test. In other words, the purchasing agent, with the assistance of the general storekeeper purchases what has been agreed upon as standard material, or such as is covered by a detail specification, and no deviation is permitted, except by special authority.

All material that is covered by a specification must be inspected and accepted by the engineer of tests to see that it conforms to the specification in every particular,

and is satisfactory before it will be taken into stock. This, does not cover patented devices, such as air brakes, lubricators, injectors, bell ringers, draft gears and other special appliances used on equipment. These are usually purchased after a test has been made and their serviceability determined. Such material, when necessary, is inspected by the engineer of tests, or the store department, before it is taken into stock.

It is not only the duty of the purchasing department to see that proper material is purchased, however, but also to see that the material is provided when it will be needed. In making purchases of material on the Chicago, Rock Island & Pacific, term contracts are, in some instances, made, depending on the condition of the market, or material is purchased on regular inquiries as the needs for the material develop. When contracts are made for certain materials, the purchasing agent endeavors to make the contract at a time in the year when it is most advantageous from a price standpoint. Some contracts are made for a year's requirements, but most of them are made for a period of three to six months, or, in other words, they are made covering requirements for a period of three to six months, and when they expire new bids are secured and contracts made accordingly. When the market conditions do not seem to warrant making contracts, purchases are made as the material is needed.

Purchasing Head Should Be An Executive Officer

On the Rock Island, the general storekeeper reports to the vice-president and general purchasing agent, which is an ideal organization as this places an executive officer in complete control of all purchases and stores on the railroad. The head of the purchasing department when an executive officer is in close touch with the policy of the company at all times, and thus is in position to take prompt action to regulate the stock in harmony with the desires of the management. For example, in case of retrenchment, due to adverse earnings, he is immediately

aware of this and can promptly make the necessary arrangements for curtailing the ordering of supplies. If the organization were otherwise, this information would be delayed in reaching the general storekeeper and as prompt results might not be obtained.

Furthermore, in the event of advancing markets, arrangements can be made with the general storekeeper to anticipate his wants and order heavily and thus take advantage of low prices, and conversely, when market conditions are on the decline, the purchasing agent can instruct the general storekeeper to hold his orders down as later purchases can probably be made at lower prices. In this way the maximum economy results to the railroad.

This is where the supply representative comes into the picture. A salesman who does not work for his customer has a hard time getting orders. An up-to-date salesman knows when market conditions are going to change and if he is working in the interests of his customer, as well as his company, he will indicate to the customer that prices are going to advance or decline—as the case may be—so that the purchasing agent can be guided accordingly.

Annual Budget Forms Working Program

On the Rock Island, annual budgets are made up the latter part of each year, covering the improvement work, both with respect to maintenance of way and maintenance of equipment, for the following year. This budget is usually tentatively approved as a working program for the ensuing year. After this information based on these budgets has been secured, the purchasing department, in conjunction with the general storekeeper, can make purchases sufficiently in advance to have this material on hand when needed.

In the case of bridges, a fall inspection is made, and a detailed statement prepared by the bridge engineer showing the important bridge work to be done on each division of the railroad during the ensuing year. This information is issued in blue print form and shows the number of the bridge and the number of pieces of piling, bridge stringers, ties, caps, guard rails, etc., required on each bridge. In the case of a steel bridge, the type to be purchased is determined upon and, if considered desirable, a contract is made by the purchasing agent for the necessary steel to renew this bridge.

Reclamation Committees Pay Well

The purchasing and stores department being under the jurisdiction of an executive officer, it is the duty of such officer not only to see that the purchase, handling, storage

and issuance of material and supplies is done properly and economically, but also to see that no material is sold as scrap that is fit for further use. To accomplish this, an organization for the reclamation of material which might otherwise be discarded or scrapped before full use had been made of it is in effect. This organization consists of a general reclamation committee, the membership of which is composed of the vice-president and general purchasing agent, chief engineer, general superintendent of motive power and the general storekeeper. This general committee has appointed division reclamation committees on each operating division of the railroad, the members of which consist of the division storekeeper, division master mechanic and the division engineer.

The work of the division committees, in conjunction with the general committee, has resulted in great economy to the railroad in securing the maximum service out of material, thereby reducing purchases on the railroad. The division committee not only follows up the use of material of all kinds and sees that it is properly handled, but it has been the means of seeing that good material was kept out of scrap and not hauled long distances to the scrap dock there to be recovered and probably hauled back over the line to the same point for use.

Disposition of Scrap

If all the officers of the company, including the reclamation committees, do their work properly, no material will be sold as scrap unless it is really scrap. On the Rock Island, the actual scrap is sold monthly by the purchasing agent. The general storekeeper, who has jurisdiction over the operation of the scrap dock, makes a monthly report to the purchasing agent of the tonnage of scrap of each class that he anticipates will be available for shipment for the next 30 days, and the purchasing department issues a list to all of the scrap purchasers with the request for sealed bids to be submitted at a certain time, and the firm quoting the best price is awarded the sale. All of the scrap is sold on sight draft bill of lading, or, in other words, the money is available for the scrap before the scrap is turned over to the purchaser.

The scrap is sold on the basis of the standard classification adopted by the American Railway Association, Division VI, and in handling it this way it is felt that the maximum price is always secured for the scrap. Anticipating the amount of scrap that will be accumulated for a 30-day period by the general storekeeper permits the scrap (having been sold by the purchasing agent as it comes in) to be shipped immediately on sales orders, avoiding extra handling and permits the conversion of the scrap into money at the earliest possible moment.



A Sunday Excursion Train from Hanover to Eisenach on the German State Railways

Influence of the Testing Plant on Locomotive Designs*

More knowledge of fundamental laws enable designers to obtain greater power and efficiency

By Lawford H. Fry

Metallurgical Engineer, Standard Steel Works, Burnham, Pa.

No study of locomotive development and operation can be complete without full consideration of the work done by the locomotive testing plant at Altoona, Pa., as the results of this work have materially influenced locomotive design not only in this country, but abroad. W. Rowland is designing locomotive boilers in England by methods developed largely from test data ob-

as to draw bar pull, but in all questions of steam production and consumption, the plant results are far more authoritative. There is much detailed information which now controls locomotive design which it would have been practically impossible to obtain without a test plant.

The locomotive testing plant is of purely American origin, and though the results of the tests made here have been much studied abroad, no real testing plant has been installed outside of the United States. The first locomotive testing plant was designed and erected at Purdue University under the supervision of Dr. W. F. M. Goss, in 1891. Locomotive testing plants have, therefore, been in use for over 33 years, that is for one-third of the century during which steam locomotives have been used in America. The growth in locomotives since the first plant was installed may be measured by the fact that the first locomotive tested at Purdue was a 4-4-0 type, a representative passenger locomotive of that date, weighing in working order about 85,000 lb., while the most recent Pacific type passenger locomotive tested on the Altoona plant had a weight of 309,000 lb., or more than three and one-half times as much.

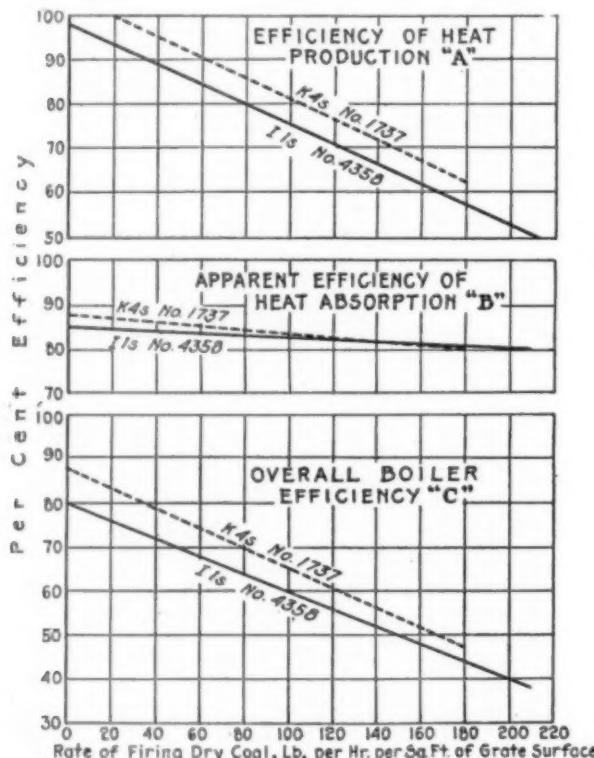
Altogether six locomotive testing plants have been built and operated. One at Purdue built in 1891, two built by the late Robert C. Quayle of the Chicago and North Western in 1894 and 1895, and one at Columbia University in 1899. These four were all of small capacity, and with the exception of Purdue have been abandoned.

The first modern locomotive testing plant capable of handling locomotives of various designs was that of the Pennsylvania Railroad built in 1904. This was designed by the late Axel Vogt, then mechanical engineer, assisted by W. F. Kiesel, Jr., the present mechanical engineer of the Pennsylvania System. This plant was first installed at St. Louis, Mo., for the Louisiana Purchase Exposition in 1904, and after operating there throughout the exposition it was transferred to its present location at Altoona.

The latest plant is that at Illinois University built in 1914 under Dr. W. F. M. Goss when dean of the College of Engineering, and Prof. E. W. Schmidt in charge of the Department of Railway Engineering. This plant follows the general design of the plant at Altoona, but provides elaborate arrangements for catching the sparks and cinders thrown out of the stack.

The bulk of the work from the various plants comes from the Purdue and the Altoona plants. The Chicago & North Western plant was of considerable service to the early American Railway Master Mechanics Association committees on exhaust nozzles. The Illinois University plant has published two reports on tests, one describing complete tests of a consolidation locomotive, the other covering tests with six sizes of Illinois coal.

The majority of the work at Purdue has been done with the two 4-4-0 locomotives built for the plant. Of these, the earlier weighed 85,000 lb. and was replaced in 1897 by a locomotive weighing 109,000 lb. which was later super-



Locomotive-Boiler Efficiencies in Relation to Rate of Firing

tained at the Altoona test plant and his formula has been adopted by the Railroad Board of India as a basis for its official method of estimating boiler capacity.

It is possible on a modern testing plant to operate any given locomotive through its whole range of power. Within this range any desired combination of conditions, such as speed, cut-off, etc., can be selected and maintained constant during a run of an hour or more, and while running under such constant conditions, measurements can be made with laboratory accuracy and completeness. It is this combination of constancy of conditions and accuracy of measurements which gives the tests made on a testing plant their great advantage over road tests of locomotives. Road tests with a dynamometer car are valuable for checking and completing information obtained on the plant

*Abstract of paper presented at the regional meeting of the American Society of Mechanical Engineers, Altoona, Pa., October 5 to 7, 1925.

heated. With this locomotive the general characteristics of locomotive operation have been studied. The most elaborate and the latest work is given in two reports published by the Carnegie Foundation in 1907 and 1910. These cover two series of tests by Dr. Goss, studying the effect on boiler and engine operation, of variations in steam pressure and variations in superheat. The information given by these and by earlier tests is of general value to a designer endeavoring to secure a proper balance between cylinder power and boiler capacity.

The installation of the Pennsylvania Railroad locomotive test plant at the St. Louis Exposition in 1904 opened a new and important era in locomotive testing. Earlier plants had been adopted only for testing light four coupled locomotives. The Pennsylvania plant was capable of handling locomotives of much greater weight and more varied design. Immediate use was made of the greater plant capacity. The series of tests made at St. Louis covered eight locomotives of widely different designs, and the data secured and published was far more complete than any previously available. These tests were the first to furnish sufficient information to enable heat balances to be drawn up for a locomotive boiler. Such balances were computed and published by the writer in 1908, and gave for the first time exact knowledge as to the relative importance of the various losses which determine the efficiency of the locomotive boiler. Since the transfer of the plant to its present location in Altoona, much work has been done in testing new locomotive designs as produced, and in providing a constantly accumulating mass of information which has made possible continued improvements in design. The greater part of the activity of the plant in Altoona has been carried out under J. T. Wallis, now chief of motive power, Pennsylvania System. Direct charge of the test plant was in the hands of C. D. Young, engineer of tests, from November, 1911 to May, 1917, and is now in the hands of his successor, F. M. Waring.

The great influence which the work done on the Altoona plant has had on locomotive design is indicated by the following statements as to the work done and conclusions reached. These are abstracted from the Pennsylvania Railroad's test plant bulletins as shown by the reference numbers.

Bulletin No. 9.—A self cleaning front end was developed which gave better results than the design recommended by the Master Mechanics Association.

Bulletin No. 21.—A comparison was made between the results obtained with long and short boiler tubes. It was established that the rate of evaporation is limited by conditions of combustion and not by a failure of heating surface to absorb heat.

Bulletin No. 23.—It was shown that a diameter of 12 in. was sufficient for piston valves for cylinders up to 27 in. in diameter, when superheated steam was used. Subsequent tests showed that valves of this diameter could be used with 30-in. cylinders with the cut-off limited to half stroke. Measurements of the stresses in the valve stems gave definite figures showing that the valve gear could be lightened to advantage by using valves of the minimum size.

Bulletin No. 24.—An extensive series of experiments on superheaters of various designs produced data showing steam consumption for varying conditions of superheat, cut-off and speed. These tests gave for the first time authentic information unobscured by other variables, as to the effect of variations in superheat on steam consumption.

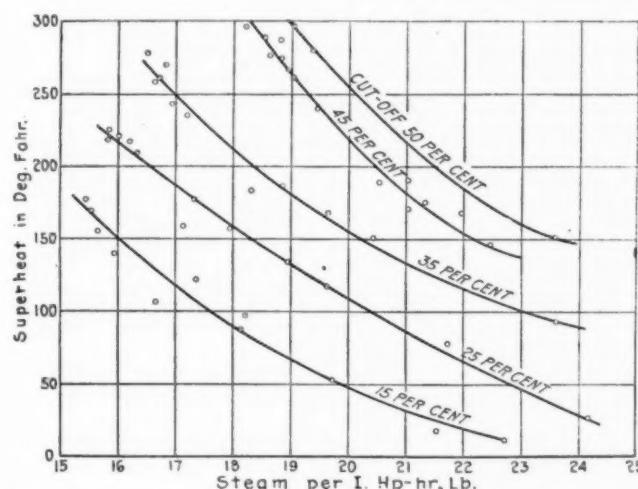
Bulletin No. 27.—As a result of earlier tests on the plant, certain changes in the design of the E-6s Atlantic type locomotive were recommended. Tests of the locomotive redesigned as recommended gave a maximum evaporation 15 per cent greater, combined with a boiler ef-

ficiency nine per cent better than the original locomotive. At the same time the engine performance was generally better so that a higher drawbar pull was developed at all speeds and the maximum drawbar horsepower was increased over 20 per cent. These advantages were secured with an increase in total weight of only 2.5 per cent. Careful design of the reciprocating parts enabled them to be kept down in weight so that the dynamic augment at 70 m.p.h. was less than 30 per cent of the static load on the drivers.

Bulletin No. 29.—Tests were made with a K-4s Pacific type locomotive built in 1914 in accordance with recommendations and experience obtained with locomotives of earlier designs on the testing plant. The coal and water rates and the high thermal efficiency showed this to be the most economical passenger locomotive so far tested on the plant. For any given amount of fuel fired, this locomotive developed more power than any previously tested.

Bulletin No. 30.—Accurate tests demonstrated the advantage gained in boiler efficiency by the use of a brick arch when high volatile coal is being burned.

Bulletins No. 31 and 32.—The testing plant having shown definitely the great difference in steam consumption



Effect of Superheat on Steam Consumption at Various Speeds and Cut-Offs

between cut-off at full stroke and cut-off at half stroke it was logical to attempt to produce a freight locomotive which, even in low speed drag service could operate at cut-offs of not over 50 per cent. The result was the development of the IIs Decapod class locomotives with a boiler pressure of 250 lb. per sq. in., instead of 205 lb. and with cylinders enlarged to enable full power to be developed without using a cut-off longer than 50 per cent of the stroke. Compared with the previous standard freight locomotive, the new locomotive with an increase of 16 per cent in weight gave an increase of 25 per cent in power, and in full gear at low speed showed a reduction of 38 per cent in steam used per indicated horsepower. This type of locomotive with feedwater heater added, giving a further increase of two per cent in indicated horsepower, is now the standard freight locomotive of the Pennsylvania System.

One of the charts has been prepared to show the growth in the size and efficiency of the passenger locomotives of the Pennsylvania Railroad since the test plant was put into service. The E-2a Atlantic type locomotive of 1904 is compared with the K-4 Pacific type locomotive of today. The curves show the indicated horsepower in relation to the rate of firing. The heavy vertical lines represent the locomotive weights. The weight has increased from 185,000 lb. to 309,000 lb. The maximum horsepower has in-

creased from 1,200 hp. to 3,300 hp. The increase in power has been much more rapid than the increase in weight. This can be seen from the fact that the indicated horsepower developed per 1,000 lb. of locomotive weight has increased from 6.5 hp. to 10.7 hp., that is, by 65 per cent.

So far we have described the work of the Altoona test plant by abstracts from the bulletins which deal mainly with the solution of concrete problems arising out of the testing of certain definite designs of locomotives. The test plant has, however, been of great value in providing material for a study of locomotive operation in general terms and in thus advancing our knowledge of the subject. Probably the greatest advance has been made in knowledge pertaining to the factors which determine boiler efficiency. Before the Pennsylvania test plant results had been studied, speculation was active as to the best proportions to be assigned to firebox and heating surface, but our definite knowledge was scanty. Dr. Goss's work had indicated that the losses by incomplete combustion were large, but with no information as to the amount of air consumed, accurate knowledge as to the details of combustion and heat absorption was lacking. The Pennsylvania test plant has changed this. During the recent tests of the Missouri Pacific three-cylinder locomotives, the writer was shown a curve of estimated smokebox temperatures drawn up before the tests were started. These, in the majority of cases, did not differ from the results actually obtained by more than 15 deg. F.

All locomotive boilers show a drop in efficiency with an increase in the rate of operation, and if the efficiency is plotted against the rate of firing it is found that the relation is best expressed by a straight line. The straight line for the boiler efficiency of the K-4s Pacific type locomotive is shown on the chart of boiler efficiencies in relation to rates of firing. The Pennsylvania test plant results if analyzed enable us to split up this overall boiler efficiency into two components—

- a—Efficiency with which heat is produced.
- b—Efficiency with which heat is taken up by the boiler

These component efficiencies follow closely straight line laws, as shown on the chart.

The information thus secured is important in any attempt to improve the boiler efficiency. The line for the efficiency of heat absorption shows but slight variation with the rate of firing, the values being uniformly high, ranging from 86 per cent to 80 per cent. These figures represent the heat taken up as percentage of the heat actually produced. Now the smokebox gases cannot possibly be cooled below the temperature of the water in the boiler. Therefore, not all of the heat produced is absorbable by the boiler. It can be computed that the boilers in question are taking up between 94 per cent and 88 per cent of the heat which it is physically capable of absorbing. This is characteristic of modern locomotive boilers, and it is evident that as pieces of heat interchange apparatus they are highly efficient and that there is but a small margin for improvement in heat absorption.

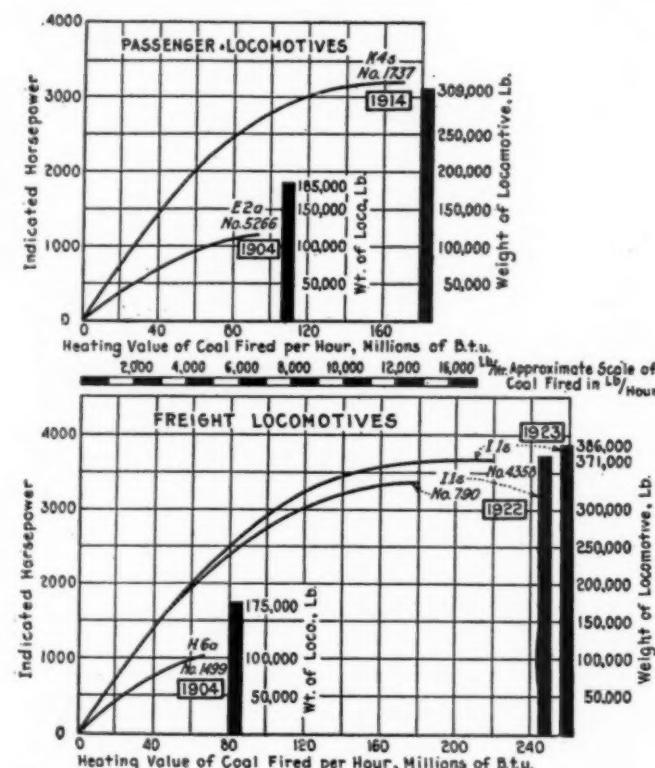
The efficiency of combustion shows a different condition. Here an efficiency of 100 per cent is possible and is shown by the tests to be reached at low rates of combustion. At the ordinary rates of operation, however, usual values are in the neighborhood of 60 per cent or less.

There is evidently a considerable field for improvement here, but it must not be assumed that improvement is easy. There is necessity for considerable study before the final answer is given. The diagrams show that boiler efficiency can be improved by reducing the rate of firing per sq. ft. of grate area. If the same power is to be maintained this means an increase in the size of the grate so

that the total amount of coal burned may be maintained. Locomotive designs adopted by various railroads in the last few months show development along this line, but as yet no testing plant analysis of performance is available.

In this connection, the writer calls attention to the fact that in the discussion of boiler efficiency in relation to the rate of operation it is usual, as has been done above, to measure the rate of firing in terms of coal per sq. ft. of grate area per hour. This assumes that the grate area is the controlling factor in determining the efficiency of combustion. Grate area is an important factor, but not the only one. Firebox volume must also be considered.

The test plant data is not yet sufficiently complete to permit a determination of the relative values of grate area



Growth in Size and Efficiency of Steam Locomotives

and firebox volume, but one series of tests with high volatile coal suggests that with this fuel the volume is the more important. The point deserves more study and it may be found that combustion efficiency can be best improved by a slight increase in grate and a considerable increase in firebox volume with appropriate arrangements for giving a long flame-way.

The question is extremely complex and can be most adequately answered by further test plant work. Doubtless this is but one of many problems by the solution of which the locomotive test plant will advance still further the development of the steam locomotive.

For the future we look with confidence to a continued growth in the use of the locomotive testing plant. The great increase in locomotive efficiency which has taken place in the last 20 years makes further advance more difficult, and makes exact knowledge a necessary condition for such advance. As it is the function of the locomotive test plant to provide exact knowledge it is not surprising that new plants are under consideration by railroads and by locomotive builders. A great step forward could be made if the American Railway Association were to construct or to take over a locomotive test plant to be devoted to the scientific and impartial study of loco-

motive designs and devices and to research work concerned with the basic scientific laws governing locomotive operation. Correct locomotive design is only possible when the definite natural laws governing locomotive operation are known. Such laws are discoverable only by accurate experiment.

Annual Convention of State Commissioners

WASHINGTON, D. C.

THE four-day annual convention of the National Association of Railroad and Utilities Commissioners was concluded on October 16 with the adoption of several resolutions favoring legislation to be urged at the coming session of Congress. These included reaffirmation of the same resolutions that were adopted at the convention at Phoenix last year, which in substance were those adopted also at Miami, Detroit and Atlanta at the three previous conventions, in favor of such amendments of the Transportation Act as would restore to the state regulatory bodies authority over the carriers which was transferred to the Interstate Commerce Commission by the law of 1920 and opposing the group plan of making rates provided by section 15a. The action was merely the adoption of a simple motion approving a paragraph in the report of the Committee on State and Federal Legislation and there was very little discussion during the convention either of amendments of the Transportation Act or of the Hoch-Smith resolution passed by the last Congress.

The association placed itself on record as in favor of an amendment of section 13 of the act to provide that before the Interstate Commerce Commission issues an order directly affecting intrastate rates reasonable time shall be given to the state commissions to make such revision of their intrastate rates as may be necessary to comply with the Interstate Commerce Commission's findings without requiring an order, but this was referred to the Committee on Co-operation with the Interstate Commerce Commission with the idea that an arrangement might be made which would avoid the necessity of asking for legislation as the federal commission has been following this practice very generally.

Another resolution adopted favored the enactment of legislation placing intercoastal water lines operating through the Panama canal under the jurisdiction of the Interstate Commerce Commission as to rates, service, etc., to the same extent as rail carriers now are, for the purpose of "stabilizing rates and service and preventing rate wars." The legislative committee was instructed to present such legislation to Congress.

A good deal of time was devoted during the convention to the discussion of motor vehicle transportation and the need for its regulation, particularly to interstate motor transportation which, under recent decisions of the Supreme Court, cannot be regulated by state authorities. The Committee on Motor Vehicle Legislation, John E. Benton, chairman, presented a draft of a bill to be urged upon Congress providing a plan of regulating such transportation through co-operation of state commissions acting as agents of the federal government. Although the report was not formally approved because of some question as to details the committee was directed to continue its study of the subject and to present a bill, in co-operation with the legislative committee, which will meet the approval of the members as to details. A motion was adopted expressing the sense of the convention that such

proposed legislation should only apply to common carriers.

On recommendation of the Committee on Public Relations, E. I. Lewis of the Interstate Commerce Commission, chairman, a resolution was adopted, for the purpose of carrying out the intent of the resolution adopted at Phoenix last year, in favor of a well-directed program of education to the end that citizens may obtain a more thorough knowledge and appreciation of regulatory problems and of the duties and responsibilities of regulatory bodies, directing the committee to make a careful survey of what is now being taught in the schools of the various states on this subject and to take such steps as may be advisable to carry out the purpose of the resolution, including if necessary the employment of expert aid in the preparation of text matter.

No action was taken on a recommendation by the Committee on Railroad Rates, which was referred to the executive committee, urging legislation to provide for regional representation on the I. C. C.

The legislative committee in its report said that at the last session of Congress it was not possible to secure attention either by the Senate committee on interstate commerce or the House committee on interstate and foreign commerce to railroad legislation and that therefore the amendments urged by the association remain as yet unacted upon. Commenting on this the report said:

The situation is a strange one. There is fairly general agreement among those who understand the Transportation Act, as the courts have construed it, that amendments are required and must some time be made. Before this the act would doubtless have been amended if there had been agreement among those who regard amendments as inevitable; but there is no such agreement.

There are those who would amend the act along the lines advocated by this association for the restoration and safeguarding of the rate-making powers of the states; others would amend only to perfect the machinery whereby state rate-making powers may be effectively and conveniently nullified. In short, there are many and various ideas as to what should be done.

In the opinion of your committee, however, the dominant sentiment in each house of Congress during the past four years has been favorable to amendment substantially along the lines advocated by this association; but a like sentiment has not predominated in the committees which have dealt with transportation legislation, or with those most potent in shaping the activities of Congress.

It is due to Senator Smith, chairman of the Senate committee on interstate commerce at the last session, and to several, if not a majority, of his associates, to say that their attitude towards that legislation appeared sympathetic. We are hopeful that at the approaching session that attitude may continue and prove to be that of the committee as a whole.

That the Transportation Act will sometime be substantially amended we do not doubt. When that time will come we do not attempt to foretell. As to railroad legislation this committee recommends the adoption of the same resolutions that were adopted at Phoenix last year, which in substance were those adopted also at Miami, Detroit, and Atlanta.

Until this year it had been believed that, in the absence of federal legislation, the several states might regulate and restrict the use of the highways for transportation for hire, even though the transportation might be in part interstate in character. But the court (Supreme Court) has held the law otherwise. The right to engage in interstate commerce is a right which may be exercised free from restraint by any other than the federal power. This principle was established in three cases involving the validity of statutes requiring certificates of convenience and necessity as a prerequisite to operation. The state statutes were held invalid so far as they applied to persons desiring to engage in interstate commerce. The decisions necessarily established the invalidity of all other similar state statutes, to the same extent. After these decisions had been rendered, at a meeting of the executive committee, attended by the chairman of this committee, President Ainey was authorized to appoint a special committee to draw a bill for presentation to Congress which should provide necessary regulation of interstate motor vehicle transportation for hire, through the agency of state commissions.

We recommend that the association go on record as favoring the enactment of federal legislation which shall subject interstate motor vehicle transportation for hire to effective regulation, similar to that now generally applicable to intrastate traffic, through the agency of existing state regulatory commissions.

The Committee on Co-operation with the Interstate

revised plan of procedure in cases involving intrastate and Commerce Commission, which had presented a tentative interstate rates, which was referred back to the committee because of some disagreement with one paragraph in it, substituted the following for the paragraph: "It is our judgment that state commissioners or their representatives would not expect or desire to sit with members of the Interstate Commerce Commission or its examiners in joint hearings in any case in which they appear as advocates. This is not to be understood as precluding a state commission from causing pertinent evidence to be presented in any such case with respect to the matters in issue." Several minor changes were made in the proposed agreement and as finally submitted it was adopted by the association. It is still to be formally approved by the Interstate Commerce Commission before it becomes effective. The plan is preceded by the following statement of principles:

Public regulation of our railroads is performed in part by a commission representing the federal government and in part by commissions representing the various states. Conflicts of jurisdiction between the two systems of public regulation have arisen from time to time, resulting in litigation and action by the courts; but the federal and state commissions were alike created in the public interest and have a common purpose, namely, the maintenance of a transportation system which will in all respects best meet the public needs. In view of this common purpose they should, and we believe they can, work together for its attainment without conflict or resort to litigation. Such co-operation is contemplated by the interstate commerce act as interpreted by the Supreme Court, and is highly desirable in the public interest.

The prime essential to such co-operation is realization of the nature and difficulties of the common problem. The state commissions realize that the railroads form a national transportation system which is not split into parts by state lines and that the public interest demands a rate structure, state and interstate, as simple and harmonious as practicable. The Interstate Commerce Commission realizes that there is danger in over-centralization of authority, that the field of regulation is vast, and that the state commissions are often better informed than itself in regard to local conditions and local needs.

In one of its most important aspects, co-operation must look forward to and have in view the avoidance, so far as the public interest will permit, of orders under Section 13 of the interstate commerce act, affecting intrastate rates.

Paragraph 3 of Section 13 of the interstate commerce act authorizes the Interstate Commerce Commission to avail itself of the co-operation, services, records, and facilities of state commissions, to confer with them with respect to the relationship between rate structures and practices of carriers, and to hold joint hearings with them "where the rate-making authority of a state is or may be affected by the action taken by the commission." Our common purpose is to give the utmost force and effect to this provision of the law.

While co-operation between the Interstate Commerce Commission and the state commissions must in the nature of things be of the spirit and not a matter of rules and regulations, we are of the opinion that the following suggested procedure, with such modifications as time and experience shall prove advisable, and, except in special cases where it may be found necessary or desirable to deviate therefrom, should be followed.

Reports were also presented to the convention by the Committees on Express and Other Contract Carriers by Rail; Railroad Service, Accommodations and Claims; Grade Crossings and Trespassing on Railroads; Car Service and Demurrage; Motor Vehicle Transportation; Statistics and Accounts of Public Utility Companies; Public Utility Rates; Capitalization and Intercorporate Relations; Service of Public Utility Companies; Uniform Regulatory Laws; Safety of Operation of Public Utility Companies, Safety of Railroad Operation. There were also several addresses and on the evening of October 15 a reception by the United States Chamber of Commerce. On October 15 members of the association called on President Coolidge at the White House.

Members of the Interstate Commerce Commission spent a good deal of time at the convention and officers of the Association of Railway Executives and the American

Railway Association were present at some of the sessions.

It was decided to hold the next annual convention at Asheville, N. C., beginning on November 9, 1926.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended October 10 amounted to 1,106,099 cars, an increase of 17,143 cars as compared with the corresponding week of last year and of 20,161 cars as compared with 1923. As compared with the week before there was a decrease of about 6,000 cars. All districts except the Eastern, Central, Western and Southwestern showed increases as compared with last year as did all classes of commodities except grain and grain products and coal, the former showing a reduction of 19,372 cars and the latter a reduction of 14,509 cars. Loading of grain and products, coal, forest products and ore was less than in 1923. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING—WEEK ENDED OCTOBER 10, 1925

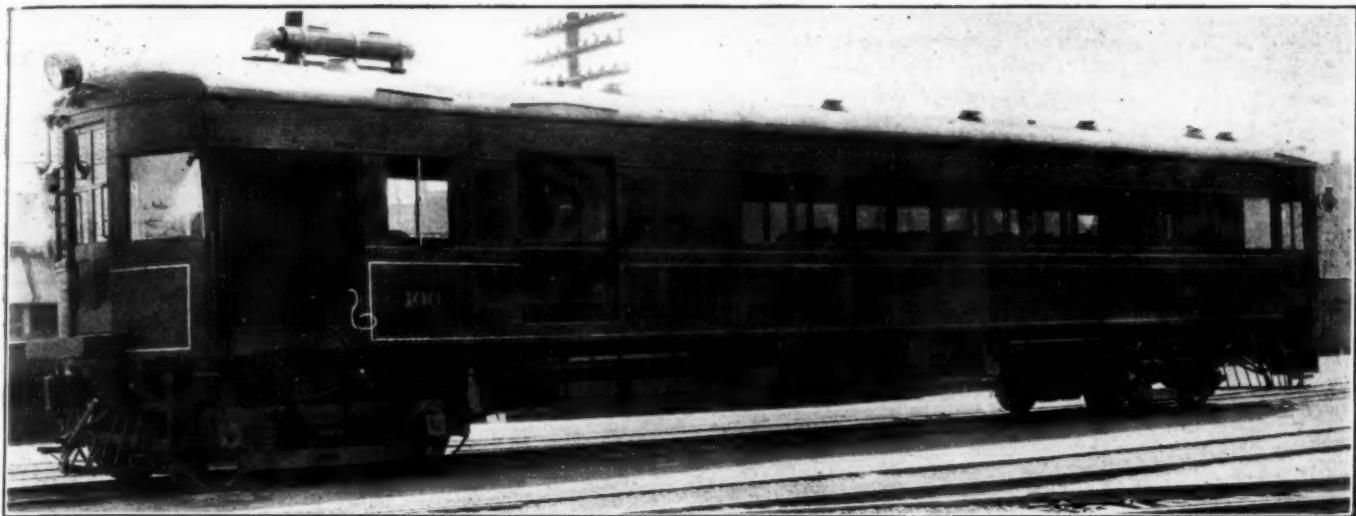
Districts	1925	1924	1923
Eastern	242,157	246,163	251,441
Allegheny	213,769	210,720	219,658
Pocahontas	59,972	53,719	45,156
Southern	165,356	152,354	148,573
Northwestern	167,519	164,194	177,430
Central Western	180,325	183,786	170,939
Southwestern	77,001	78,120	72,841
Total Western	424,845	426,000	421,210
Commodities			
Grain and grain products	43,214	62,586	50,292
Live stock	44,594	41,619	43,246
Coal	184,331	198,840	195,066
Coke	12,868	9,662	11,928
Forest products	70,929	70,307	75,210
Ore	52,213	46,509	60,579
Mdse. L. C. I.	270,929	259,562	251,646
Miscellaneous	427,021	399,871	397,973
Total	1,106,099	1,088,956	1,085,938
October 3	1,112,463	1,077,748	1,079,776
September 26	1,120,645	1,087,954	1,097,493
September 19	1,098,428	1,076,847	1,060,811
September 12	975,434	1,061,781	1,060,563
Cumulative total, 41 weeks	40,065,487	37,868,647	39,468,953

The freight car surplus for the week of October 1 to 7 averaged 136,009 cars, including 56,961 box cars and 5,825 coal cars. The Canadian roads for the same week had a surplus of 8,577 cars, including 5,250 box cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended October 10 showed a decline of 1,428 cars from the previous week. Loadings in the eastern division have been steadily increasing since August 1, but after a sharp upward movement from the last week in August to September 26 loadings in the western division have fallen off in the last two weeks, and last week were 5,432 cars less than the high record for the western division in the week ended September 26. The decrease was almost entirely in grain. Compared with the same week last year the increase in grain loading was 1,302 cars, in miscellaneous freight 1,891 cars and in total loadings 5,516 cars.

Commodities	Total for Canada			Cumulative Totals to Date
	Oct. 10,	Oct. 3,	Oct. 11,	
Grain and grain products	17,149	20,397	15,847	298,027
Live stock	3,653	2,916	2,865	94,847
Coal	9,154	7,217	7,388	157,419
Coke	326	350	319	11,485
Lumber	3,799	3,875	3,708	145,944
Pulp wood	1,594	1,733	1,554	110,221
Pulp and paper	2,051	2,120	1,720	82,836
Other forest products	2,886	2,545	2,353	114,819
Ore	1,674	1,749	1,692	56,979
Merchandise L. C. I.	15,543	15,982	15,758	621,165
Miscellaneous	16,595	15,958	14,704	512,895
Total cars loaded	73,424	74,852	67,908	2,206,637
Total cars received from connections	35,061	35,896	31,334	1,352,392
				2,215,310
				1,280,677



Brill Gas Electric Car which Weighs Complete 85,000 lb. and will Pull 150,000 lb. Trailing Lead at 32 miles an hour.

Double End Controlled Brill Gas-Electric Car

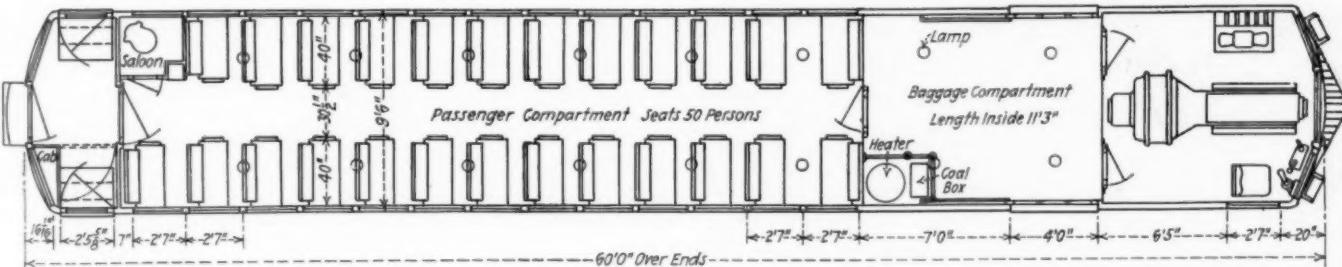
*Driven by a Brill-Westinghouse 250-hp. gas engine—
Flexible control incorporated in one throttle*

WITHIN the last few years much progress has been made in the design of more powerful and economical self-propelled cars. The J. G. Brill Company, Philadelphia, Pa., has recently placed in service a gas-electric car, equipped with a newly developed Brill-Westinghouse Model No. 250 six-cylinder, 250-hp. engine. The engine is directly connected to a 160-kw. Westinghouse d.c. generator which drives two 140-hp.

minimum. The unit is located longitudinally in the forward end of the car with the generator at the rear.

The gasoline engine is of the six-cylinder, vertical, four-cycle type, designed for continuous duty, developing 250 hp. at 1,100 r.p.m. Its bore and stroke are $7\frac{1}{4}$ in. by 8 in. which gives a piston displacement of 1,980 cu. in.

Each cylinder is provided with dual overhead valves on both the exhaust and intake sides. The ignition consists of



Floor Plan of the Brill Gas-Electric Car—There Are Seats for 50 Passengers

Westinghouse 600-volt railway motors mounted in the forward truck. The car complete, without load weighs 85,000 lbs. and will run at a maximum speed of about 60 miles per hour as a single unit or with a different gear ratio, will pull a 150,000 lb. trailing load at 32 miles per hour.

The Power Plant

The engine and generator are combined as a single unit and mounted on a rigid common base which is supported on the underframe through live rubber blocks. Distortion of the underframing is thus prevented from causing misalignment of engine and generator and the transmission of vibration and noise to the car body is also reduced to a

two independent, high tension magnetos fitted with impulse couplings, one located on each side of the engine, connected to two independent sets of spark plugs. The ignition switch is arranged for the control of either or both magnetos. The engine is equipped with two 32-volt starting motors driving through Bendix gears and operated from the storage battery. An Exide 16-cell, 32-volt battery furnishes the current for the car lighting, for starting the engine and for the initial excitation of the exciter.

A vacuum feed supplies fuel to the two Schebler carburetors from two 75-gal. tanks, located under the car floor.

The cooling system consists of a fin and tube type rad-

iator with a 25-gal. expansion tank which is located in the left side of the car so that it is equally effective for operation in either direction. The water is circulated by a mechanically driven centrifugal pump and air is forced through the radiator by a 6-hp. motor-driven fan.

The Generator and Motors

The engine is directly connected to a rugged railway type commutating pole, self-ventilated, direct-current generator of 160 kw. capacity, operating at a variable voltage up to approximately 600. A separate exciter is mounted at the commutator end of the generator shaft.

The current from the generator passes to two Westinghouse No. 557 traction motors which drive the car. They have an hourly rating of 140 hp. at 900 r.p.m. using 600 volts, 202 amperes. Each motor is suspended between the axle and the truck frame, driving its axle through a silent helical gear running in grease.

The Control

The control of the car is incorporated in the throttle lever and a single plug switch which are chained together.

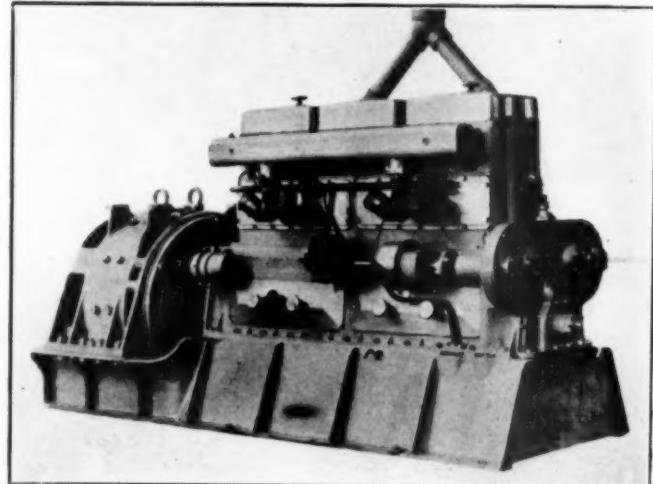


**The Operator's Cab Is Located in Front of the Engine Room
—Note the Signal Horn, Window Wiper and Adjustable Electric Headlight**

As the car is double end controlled, the operator only has to take the handle and plug to either end of the car. Each plug receptacle contains two holes, one for forward operation and one for reverse. The throttle handle operates the engine throttle and makes the necessary electrical connections. Its first movement from the idling position automatically closes the switch connecting the battery to the exciter and the motors to the generator. Further movement of the handle gradually opens the engine throttle, causing the engine speed to increase. The increased speed of the engine-generator set increases the voltage and the acceleration of the motors which are arranged for either

parallel or series connections at the discretion of the operator. When the gasoline engine is at a point of delivering maximum power, it is protected against overloading by means of the generator characteristics which inherently provide for a constant horsepower output equivalent to the rating of the gasoline engine. The engine is equipped with a throttle governor which prevents it from exceeding a predetermined maximum speed.

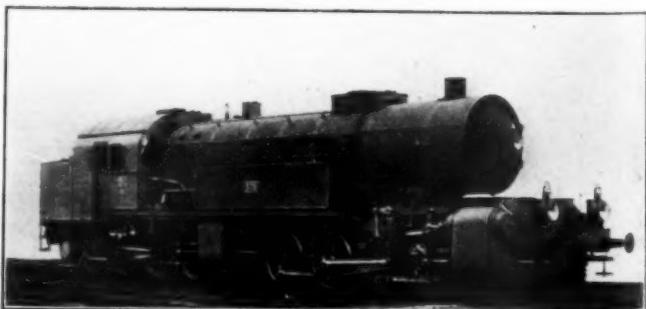
A heat indicator for the engine is located in the front cab. In order to reduce complication to a minimum, the temperature of the motor is indicated in the rear cab by a small lamp which lights when the indicator needle in the front cab passes the safety point. The electro-pneu-



Brill-Westinghouse 250 hp., Six-Cylinder, Continuous Duty Engine Equipped with Two Carburetors, Two Magnets and Two Starting Motors

matic relays and main switches, together with the lamp regulator are located in a cabinet on the right side of the engine room back of the operator's station. The rear operator's cab is on the left side of the car and when not in use is closed in to clear the steps and trap door of the vestibule.

The motor car is 60 ft. long over the end sills and has a seating capacity for 50 passengers. The baggage compartment is 11 ft. 3 in. by 9 ft. 6 in. and contains a Peter Smith hot water heater. The car is furnished with Westinghouse air brake equipment, two incandescent headlights one on each end of the car, M.C.B. standard couplers, hand brakes of the staffless type and all other equipment necessary for railway operation. The motor and trailer trucks are the Brill No. 27 M.C.B. type.



Kadel & Herbert

A Swedish Mallet Tank Locomotive

Nickel Plate Hearing

WASHINGTON, D. C.

THE hearing on the Nickel Plate unification application before Commissioner Meyer of the Interstate Commerce Commission was resumed on October 19 and 20 for the presentation of evidence on behalf of the protestants and then adjourned until October 26, with the expectation that the record will be closed within the week. J. R. Nutt, president of the Union Trust Company of Cleveland, director of the Nickel Plate and of the Chesapeake & Ohio and one of the four stockholders of the holding company which controls most of the Van Sweringen enterprises, is to be the first witness on October 26, and is to be followed by witnesses on behalf of the minority stockholders of the Hocking Valley after which the Scott committee, representing protesting minority stockholders of the Chesapeake & Ohio, has two witnesses to testify. The case will then be submitted to the commission on briefs and oral arguments at a date to be set.

When the hearing was resumed on October 19 the first witness called on behalf of the minority stockholders of the Chesapeake & Ohio was Everett Jacobs, president of a real estate investment company in New York and a stockholder of the Chesapeake & Ohio. He said that at a conference with W. J. Harahan, president of the Chesapeake & Ohio, in New York last January, after he had protested that the terms proposed for the lease of the Chesapeake & Ohio to the new Nickel Plate company were unfair, Mr. Harahan had told him that he was in accord with the dissenting stockholders and not in sympathy with the terms proposed, but that there was time to have them changed. He said he had then urged Mr. Harahan to make a record for himself by coming out and telling the stockholders how he felt about it instead of assenting to the Van Sweringen proposals. Mr. Harahan, when on the witness stand, had been asked regarding this conference with Mr. Jacobs, and had denied having made any such statements to him.

William A. Baldwin, vice-president of the Erie, was next called and questioned regarding details of the Erie operations, particularly with reference to the relations with the New York, Susquehanna & Western. He was asked whether, at a conference of officers of the roads included in the merger plans at Cleveland on May 12, it had not been agreed to load up the record in this case with so much data and information that the opposition would not be able to digest it. He said he had heard nothing to that effect. Mr. Baldwin was then questioned regarding data he had furnished for the presentation of the case to the commission, including estimates used in the estimate of possible savings in operating expenses presented by J. J. Bernet, president of the Nickel Plate, and he was asked to furnish for the record copies of all data and correspondence he had with relation to this case.

George H. Minor, vice-president and secretary of the Erie, testified that F. D. Underwood, president of the Erie, had criticised the plan for the lease of the Erie to the Van Sweringen company and had not voted for it as a director. Mr. Underwood had been included in a list of witnesses whom H. W. Anderson, counsel for the protestants, had asked to have called, but later Mr. Anderson said that he understood Mr. Underwood was not well but that he had made arrangements which would make his testimony unnecessary. Mr. Minor was first asked to give the list of directors of the Erie and show their connections and the number of shares of stock they held. He said the stock list would not mean anything because the Erie directors are not required to hold qualifying shares and, because the stock pays no dividends, transfers are seldom recorded on the books. After going

over the list he gave an affirmative reply to a question by Mr. Anderson whether, when the lease was approved by the directors on January 23, 1925, there were only seven directors present, of which six voted for the lease, including three who were of counsel for the company and three who had associations with J. P. Morgan & Co., or the First National Bank, of which George F. Baker is chairman. He said that Mr. Underwood had not voted because he had received many letters from stockholders objecting to the plan and because he had an idea that as president he represented all the stockholders of the company and had better not vote.

Mr. Minor said he had never heard Mr. Underwood say that he was opposed to the whole scheme, but that he had heard him criticise the plan, saying it included some good features and some bad, and that if he were doing it he would do it differently. He said Mr. Underwood had not given his reasons at the time of the vote but that he had heard him say that he felt he had built up a good working machine, that the road was in good physical condition, and that just as it was about ready to come into its own it was going into a merger on the basis of its earnings in the past, whereas if it could wait a few years it might make a better deal. "I think he felt that there were some transportation advantages", said Mr. Minor. "I think he said he didn't see how an alliance with the Nickel Plate would give the Erie any additional business, although the Chesapeake & Ohio and the Pere Marquette might."

Mr. Minor was also questioned regarding a statement made to the Erie board by J. E. Oldham, of Merrill, Oldham & Co., regarding the advantages of the proposed merger. He said Mr. Oldham had prepared a statement for A. M. Anderson, of J. P. Morgan & Co., a director, and later had been asked to make a statement before the board. He said he did not know whether Mr. Oldham was retained by the Erie or by Morgan & Co., but that it had been arranged by Mr. Anderson. He also said a statement was made by Jackson E. Reynolds, president of the First National Bank, who had looked into the matter for Mr. Baker. He was asked to produce a certified copy of the statement made by Mr. Oldham to the board.

Mr. Anderson then said that before passing to the next phase of his case he would like to have the testimony of J. R. Nutt, whom he had previously asked for. W. A. Colston, general counsel of the Nickel Plate, said he did not know when Mr. Nutt would be available as he was still in the west and he did not know when he would return. He offered to produce any information that might be desired of Mr. Nutt but Mr. Anderson said he wanted to question Mr. Nutt, who, he said, is a director of the Chesapeake & Ohio and of the Nickel Plate and one of the four stockholders of the Vaness Company, which controls the Nickel Plate and through which the control of the whole proposed system is to be exercised. He said if anyone knew where he was he would like to have a process served on him and when Mr. Colston said he did not know where Mr. Nutt was Mr. Anderson asked who did know who might be called as a witness. Mr. Colston gave the name of Mr. Nutt's secretary, but on the following day he received a telegram from Mr. Nutt saying he would appear when desired.

At Mr. Anderson's request Mr. Colston took the stand and was questioned regarding his connection with the various transactions involved in the proposed unification plan as director of the Nickel Plate, Chesapeake & Ohio and Hocking Valley and as counsel for the Nickel Plate and the deposit committee.

At the request of counsel for the protestants the Erie furnished a statement that from 1895 to August 31, 1925,

it had expended \$128,000,000 on additions and betterments which had not been capitalized.

Howard T. Page, certified public accountant, took the stand on October 19 as the first witness representing the Scott committee and presented a number of statistical exhibits, compiled from the Interstate Commerce Commission records, comparing the earnings, expenses, assets, traffic, etc., of the companies proposed to be included in the unification and giving the percentage for each road to the total for each year from 1916 to 1924. Similar exhibits had been introduced on behalf of the applicants but some of the data had been compiled for different periods and many adjustments had been made, which were the subject of much of the protracted cross-examination which took so much of the time of the hearings during the summer. Mr. Page's first exhibit showed combined net income for the companies in the proposed system for 1924, amounting to \$34,993,412, of which the Chesapeake & Ohio contributed 34.94 per cent, the Nickel Plate 16.77 per cent, the Hocking Valley 6.75 per cent, the Erie 27.44 per cent, and the Pere Marquette 14.10 per cent. Another exhibit showed that in 1924 the Chesapeake & Ohio had net current assets amounting to 67.5 per cent of the total for the combined roads, in 1923, 53.1 per cent, in 1922, 61.83 per cent, in 1921, 73.69 per cent, and for the earlier years from 110 to 481 per cent, as the other roads had an excess of current liabilities over assets. An adjournment was then taken to allow Mr. Page to complete some additional exhibits which had been delayed because of his illness and the hearing on October 20 was devoted to a presentation on behalf of the short lines. Mr. Page submitted a chart purporting to show the relation between the various companies controlled by the Van Sweringen interests.

Moultrie Hitt, representing the New York & Pennsylvania, a 56-mile line connecting with the Erie at Canisteo, N. Y., put on two witnesses to testify as to the public need for the service performed by that line which they desire to have "taken care of" in some way. G. M. Beasor, general manager, testified regarding the amount of traffic handled by the line, which he said had been operated at a deficit for several years. When he intimated that the condition of the road would be improved by a better division of the through rates on traffic turned over to the Erie, Commissioner Meyer took occasion to point out the duty of short line managers to call the attention of the commission to such situations. He said the commission could not be expected to "go looking for them with a spy-glass" if those interested fail to let it know and suggested that even if funds were lacking to employ lawyers it would take only a bottle of ink and some paper to bring the matter to the commission's attention.

H. L. Somers, a minister of Canisteo, N. Y., told of the dependence of the public on the service of the road and said that a committee of citizens had been supporting it by raising a fund of \$75,000 as a subsidy at the rate of \$25,000 a year. Mr. Hitt then called Mr. Colston as a witness and asked if the proponents of a merger plan do not owe a duty to the public to "take care of" such lines. He also asked if the applicants had any proposal to make with regard to the New York & Pennsylvania. Mr. Colston said that the New York & Pennsylvania had itself made no proposition and suggested that a contract might be made with it similar to those made by the Nickel Plate with the Akron, Canton & Youngstown and the Wheeling & Lake Erie by which the present routing of traffic would be preserved so that they would not be injured in any way. He said he recognized no obligation on the part of the applicants to make a proposal to assume the losses of a road that is no longer paying because the timber for which it was built has been cut off

and that he thought Mr. Hitt was on the wrong track in trying to inject the troubles of the road into his case. If its divisions are inadequate that is a matter to be submitted to the commission by itself.

Commissioner Meyer then asked Mr. Colston if his attention had been called to the case in which the Illinois Central was authorized to take over the Gulf & Ship Island, in which it was asked to require that the Fernwood, Columbia & Gulf be taken over also, but instead imposed a condition that if the road should find itself unable to maintain service the commission, on application, might require the Illinois Central to operate the road. He asked if such a condition might fit the case of the New York & Pennsylvania and Mr. Colston replied that some such arrangement might be made. Commissioner Meyer then entered upon an informal discussion, off the record, of the relation of short lines to consolidations, saying that he had felt that the commission should go as far as it could under the law to preserve railroad service for the benefit of the people dependent upon it but that it ought not to be used to compel a private bargain for the sale of the short line to a larger road. He said that when a short line that has not been able to make any money tries to get itself sold to a trunk line through the exercise of the power of the commission it often suddenly becomes very valuable and that the power of the commission ought not to be used to compel an unreasonable price. He said he was not applying this remark to the present situation but told Mr. Hitt that he thought Mr. Colston had a right to expect some sort of proposal from the New York & Pennsylvania. Mr. Colston said that if it would offer something practical he would be glad to co-operate.

The discussion of the relation of short lines to the proposed unification was continued by Ben B. Cain, vice-president and general counsel of the American Short Line Railroad Association, who said that four other short lines, of the 20 that connect with the lines of the proposed Nickel Plate system, desire the commission to issue an order "allocating" them to the proposed system. These were the Youngstown & Ohio, the Middletown & Unionville, the Arcade & Attica, and the Chicago, Attica & Southern. Commissioner Meyer said that he was using generalities and expressed some doubt as to what "allocating" meant or what good it would do. He said he could understand a proposal that the trunk roads he required to operate the lines and that the Bureau of Finance for a year and a half now has been examining all applications to the commission that "point in the direction of consolidation" with a view to the short lines in the territory involved that perhaps ought to be included. Mr. Colston remarked that the present application does not involve consolidation although it is proposed ultimately to consolidate the lines.

Mr. Cain said that if this is not a consolidation and if the big roads are to be allowed to acquire what roads they want without any requirement that they include weak lines as contemplated by Congress he did not see how the commission could ever "unscramble" them to require the inclusion of other lines, unless it keeps its orders open subject to a condition that certain lines be included. Commissioner Meyer asked if the commission had any more power to require the buying of a line than to require the selling of one. Mr. Colston asked Mr. Cain whether he could say what terms the four roads would propose. Mr. Cain said he was not arguing now that they ought to be consolidated but that they ought to be "constructively allocated" and that divisions ought to be prescribed by groups, because the commission could never get anywhere by taking up single applications for increased divisions on application.

Reading Uses Continuous Control

Three-speed system installed on high-speed dense traffic double track line, Camden, N. J., to Atlantic City

By A. H. Yocom

Signal Engineer, Reading Company, Philadelphia, Pa.

THE Reading Company has installed and recently placed in service an installation of three-speed continuous automatic train control, as manufactured by the Union Switch & Signal Company, on the double track main line of the Atlantic City railroad, between Camden, N. J., and Atlantic City. This installation, which includes 52.9 miles of double track and 2.3 miles of three track line, with 50 locomotives equipped, was made in compliance with the first order of the Interstate Commerce Commission dated July 13, 1922.

The Atlantic City railroad is primarily a high-speed passenger line. The traffic is very dense during the summer and holiday season and trains are frequently operated on a close headway. Several of the trains running on this line have a scheduled speed from start to stop exceeding 60 miles an hour and are reputed to be among the



Home Signal Governing Entrance to Three-Track Section Equipped With Train Control

Factors Governing Decision

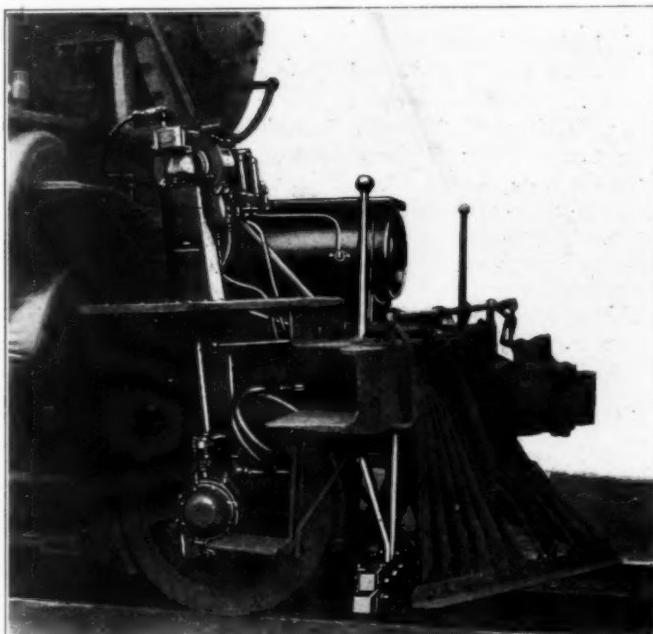
to Use Continuous System

The type of traffic on this road made it necessary that a careful study of the train control systems available be made in order to determine which would give a maximum of safety without reducing the capacity of the line. It was decided that the plain automatic stop would not in any case be suitable for the conditions existing on this road, and that a choice should be made between the intermittent speed control and the continuous speed control types.

Intermittent speed control is obtained by two general methods, the ramp type relying on mechanical contact, and the inductive type where control of the engine is effected by inductors placed at definite locations along the track. The ramp type involves actual mechanical contact between the locomotive and the wayside apparatus. This was considered undesirable in view of the high speeds obtained on the Atlantic City Railroad, and there was the further objection of the possibility of packed snow or ice giving undesirable brake applications by rubbing against the shoe.

The inductive type of control overcame the objections due to mechanical contact and close clearances, but, being intermittent in character, was considered to reduce the track capacity. This was due to the necessity of a restrictive indication being carried to the next inductor location before being released, even though the condition requiring the speed restriction ceased to exist just after the engine passed over the first inductor.

The continuous speed control places the train under control at all times and instantly affects it when required by any change of track or signal conditions. A train having entered a "caution" or "occupied" block will be released immediately when the obstruction is removed, whether the train is near a signal location or not. If a train should pass a clear home or distant signal and a more restrictive condition ensue, the locomotive will be affected instantly and train control will come into effect to enforce the slowing up or stopping of the train independently of the location of the signals. Consideration of the above and other features of the various types of



Front Axle Drive, Telescopic Drive Shaft for Operating Governor and Governor with Speed Indicator Magneto Attached

fastest in the world. On Sunday mornings during the summer from 18 to 20 train sections, each carrying from 10 to 14 cars, leave Camden within an hour for seashore points, and on Sunday nights between 35,000 and 40,000 passengers are conveyed northward between the hours of 4 and 11. For many years previous to the installation of automatic train control, this entire line had been completely signaled with Hall automatic disk signals controlled by direct current track circuits, and interlocking towers had been located at all junctions along the road.

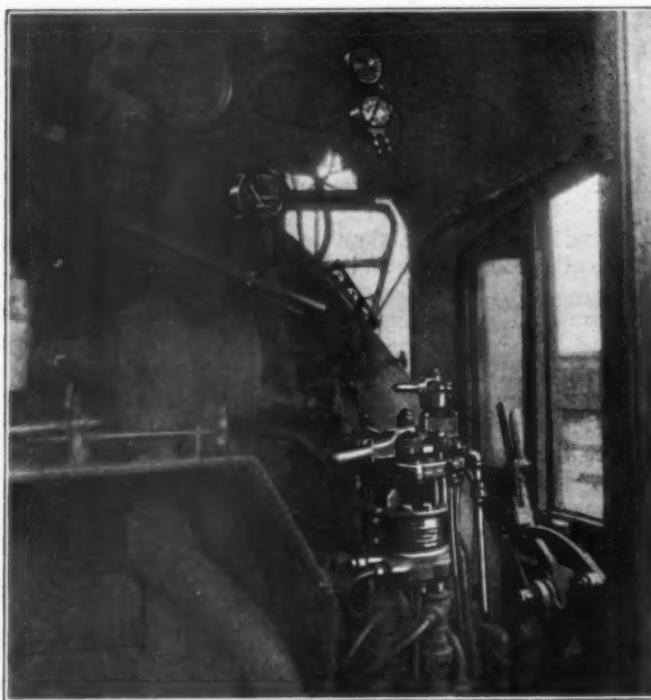
train control brought the conclusion that the three-speed continuous type was best suited for the Atlantic City Railroad service and a contract for the necessary apparatus was awarded to the Union Switch & Signal Company.

Speed limits of 85 m.p.h. for high speed, 40 m.p.h. for medium speed and 25 m.p.h. for low speed for passenger trains; and 40 m.p.h. for high speed, 30 m.p.h. for medium speed and 25 m.p.h. for low speed for freight trains are in force, and the signal spacing has been arranged to suit the braking distance for these speeds. Speedometers have been fitted to all engines to enable the enginemen to determine the speed at which they are running.

Principles of Track Circuit Controls Explained

The roadway circuits which control the locomotive are the usual alternating current track circuit, and an additional circuit known as the loop circuit. The track circuit is fed to the rails from a transformer through a reactor at the leaving end of the block, and is always arranged so that the engine runs towards the transformer. The track current runs down one rail through the wheels and axles of the train and back through the other rail. The loop circuit is fed through two resistors in multiple to the rails and passing along both rails leaves through two resistors and returns over the line wire to the transformer.

The locomotive carries two pairs of receiving coils



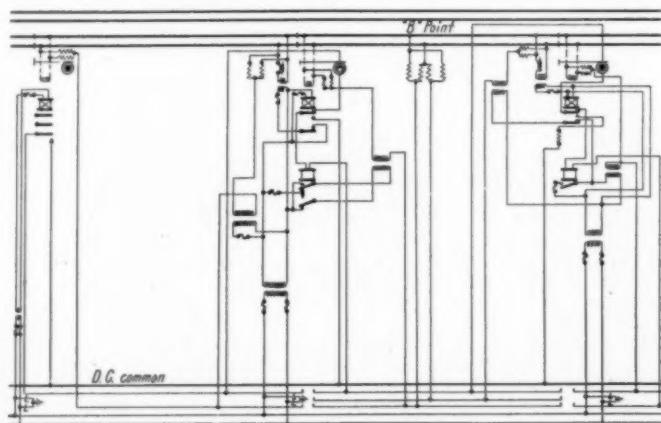
Interior of Cab Showing Engineman's Brake Valve with Acknowledging Valve Immediately Behind, Also Cab Indicator, Air Gages and Speed Indicator

mounted on laminated structures which are arranged so that one, called the track receiver, is immediately behind the pilot, and the other, known as the loop receiver, is at the rear of the tender. The coils on the two receivers are similar to each other, but in the track receiver are connected so that the magnetic flux due to currents running in opposite directions in the rails, i.e., the track circuit current, will induce voltages in the two coils that will add. In the loop receiver the coils are connected so that it is necessary for the currents to flow in the same direction in both rails for the voltages to add—by this method the receivers are made selective so that the front,

or track receiver, is influenced by the track circuit alone, and the rear, or loop receiver, by the loop circuit alone.

The presence of both track and loop circuits induces voltages in the respective receiver coils which are amplified to energize the two elements of the train control relay. This relay, is similar to the 3-position Model-15 track relay. The track circuit, being fed through a reactor, will have considerable phase displacement from the loop circuit, which is all resistance. This phase displacement is carried through to the train control relay and causes the relay to pick up. Reversing the relative instantaneous polarity of the two currents causes the relay to pick up in the opposite direction while the absence of either track or loop current will release the relay.

A train control generator, similar to the usual headlight



Typical Plan Illustrating the Application of Track and Loop Circuits in Three-Speed Train Control Territory

generator, is carried on the locomotive to provide direct current at 32 volts. This generator is reserved exclusively for train control, but the wiring is arranged so that by means of a transfer switch in the cab, the headlight generator can be used to provide the 32-volt current in case of failure of the train control generator. This 32-volt direct current is carried over contacts on the train control relay to lights in the cab indicating "H" when the relay is in the normal position, "M" when in the reverse position and "L" when the relay is de-energized. This current is also taken over normal and reverse contacts to energize the high and medium speed magnets respectively.

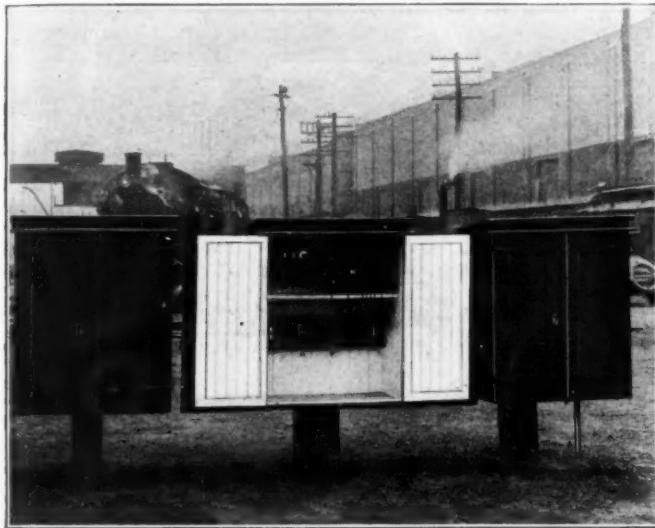
These magnets are located in the governor portion which is placed in front of the engine directly above the front axle from which it is driven. Valves operated by the governor open as the train speed rises, and if the medium or high-speed magnets should not be energized and the train be above the low-speed limit the valves will permit the brake application valve to make an automatic brake application. Similarly it is necessary for the high-speed magnet to be energized when the train is above the medium-speed limit.

Function of Wayside Apparatus in Controlling Locomotive

The control of the roadside circuits is incorporated in the signal control system, the signals being of the two-position home and distant disk type with the distant signals located on separate masts approximately 5,000 ft. from their respective home signals. This arrangement of signals insures that the engineman of a high-speed train receives the caution signal at the point where he should act upon it. The track circuits between home signals are operated on the cut section principle, the control of each circuit being taken over front contacts of the

preceding track relay, and so on up to the next home signal. Any train between home signals will thus de-energize all track circuits to the next home signal behind it.

The loop circuits are controlled by the signal control circuits so that, with a clear track to the next home signal, there will always be a loop circuit giving an "H" indication from a home signal to the next distant signal. As the train passes the distant signal it receives an induced loop circuit current whose polarity is controlled by a relay in series with the distant signal control so that, if that signal shows "caution", the train control will indicate "M", but if the signal is "clear" the indication will be



Electrical Control Equipment to Enable Enginemen to Make a Departure Test of Train Control Before Leaving the Roundhouse

"H". This indication is held until the train reaches what is known as the "B" point, located at braking distance at medium speed from the home signal. At this point the loop circuit from the distant signal goes back over the line and another loop circuit controlled by the home signal is picked up. If the home signal is clear the indication received will be "H", but if the signal is at stop the loop circuit will be open so that the indication received on the engine will be "L". With the above arrangement of circuits, a train, after passing a clear signal, may proceed at any speed up to the high-speed maximum permitted, until it arrives at a distant signal showing caution. On passing this signal the cab indication changes to "M", and the engineman must take steps to reduce the speed of his train to below the medium-speed limit. When the train is below this intermediate limit the brakes may be released and the train run, under this limit, until within braking distance of the home signal. At this "B" point the indication in the cab changes from "M" to "L". The engineman must acknowledge this change by the movement of a small lever and then proceed to apply the brakes again to bring the train smoothly to a stop at the home signal.

If the engineman should fail to operate the brakes and continue at high speed the train control will come into effect and automatically apply the brakes. This application will be split in the same way as a normal manual application, a first reduction of about 8 lb. based on 70-lb. initial brake pipe pressure, taking place, followed by a further reduction of about 13 lb., so that the automatic braking will be as smooth as the manual. In no case will the train control give an emergency application and in every

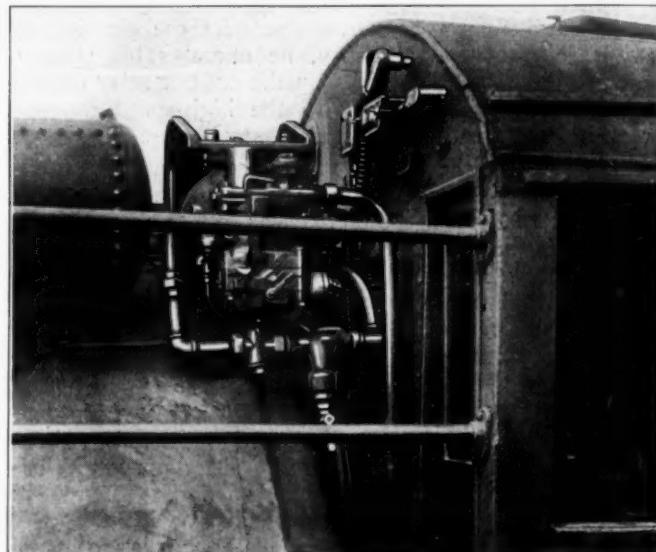
case where an automatic application has taken place the brakes will continue to apply at the service rate until the roadside restriction has been removed and the engineman has manually released the brakes. Provided the engineman has acknowledged the change of indication, where a roadside restriction has occurred, he will be able to release the brakes as soon as the train is below 25 miles an hour and will be able to proceed under the low-speed limit.

Reliability of Power Supply Essential

As the trains are dependent upon a constant flow of current through the rails it is imperative that the power supply should be absolutely reliable, and all steps possible have been taken to insure this. The signal transmission line is No. 6 copper wire conducting 4,400 volts, 3-phase, 60 cycle current and is carried on poles spaced 100 ft. apart and sectionalized about every 4 miles. This line also supplies energy for lighting the stations. A No. 6 copper ground wire is taken along the extreme top of the poles and grounded through Paragon grounds at every tenth pole.

The transmission line is divided into two sections, Camden to Hammonton and Hammonton to Atlantic City. Commercial power is normally supplied through substations at Camden and at Atlantic City, and a reserve power supply is provided for either or both sections through a substation at Hammonton.

The substations through which the supply of power is controlled are unattended and automatic in action. They



Brake Application Portion of Train Control Equipment Mounted Behind Cab with "Cut-Out" Lever Sealed in the Cut-In Position

are so arranged that, if the supply at Camden or Atlantic City should fail the substation at Hammonton will come into service instantaneously to take the load. Each substation is provided with a motor-operated three-phase induction voltage regulator which automatically controls the supply to insure a constant voltage feed to the line. Power is purchased at 2,300 volts and stepped up to 4,400 volts at each substation.

Transformers are provided at each track circuit location to step down the power to 110 volts. These transformers are 0.75 k.v.a. capacity, oil cooled; and are provided with the usual expulsion fuse cut-outs and compression type lightning arresters. Connection from the line to each

lightning arrester is through a porcelain plug cut-out. This cut-out is fitted with solid wire instead of the usual fuse and is used to avoid the necessity of killing the line in order to change a defective lightning arrester.

The track circuits in the original signaling were d.c.; these were all changed to a.c. and several cut sections were eliminated. The original normal danger Hall disk signals have been retained and are operated by d.c. controlled by the a.c. track relays.

Directional Control on Section of Three-Track

Between Haddon Heights and Magnolia, 2.3 miles, there is a third track which may be used in either direction. The directional control of the signaling is taken care of by a series of traffic relays controlled by check locking between "NO" and "SO" towers at Haddon Heights and Magnolia, respectively. These traffic relays also control the energy supply to the track so that the track circuits are always energized from the leaving end and according to the direction of traffic which has been set up.

Cut-out Feature Reliable and Simple

Up to the present, train control has been applied to the main line only, and in order to permit engines equipped with the apparatus to operate on the Cape May and Mullica Hill branches it has been necessary to provide circuits to suspend the operation of train control while the engines are in this non-equipped territory.

The wayside circuits for performing this function are known as "cut-out" circuits and are located at Williams-town Junction and Winslow Junction. They comprise the usual track circuit with a special high-value loop circuit. As the engineman passes over one of these circuits on leaving train control territory, he operates his cut-out switch in the cab. This picks up the cut-out relay on the engine and provides energy to the high-speed magnet direct, independently of the train control relay.

The control of the cut-out relay is such that it can only be picked up when the engine is on the special wayside circuit and that when the engine has left this circuit, the relay will be held up only as long as the engine remains out of control territory. As soon as the engine re-enters track equipped for train control, this relay becomes de-energized and the high-speed magnet is again controlled by the train control relay.

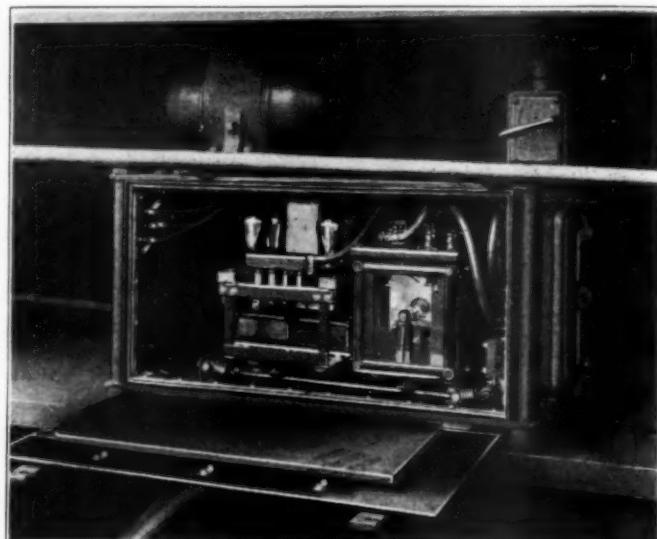
To insure that the train control shall be cut in before the trains leaving non-equipped territory enter train control track, continuously energized cut-in circuits have been provided at the end of the non-equipped territory at Winslow Junction and Williamstown Junction. The cut-in circuits consist of a normal track circuit with a normal loop circuit. The suspension of the operation of train control depends upon the energy being constantly applied to the cut-out relay, on account of the fact that when this relay is once released, a cut-out circuit is required to pick it up again.

At Cape May, Ocean City, Mullica Hill and other locations outside train control equipped territory, engines lie over for a considerable time and all generators and air pumps are shut down, which results in the de-energization of the cut-out relay. For maintenance reasons it was not considered advisable to install cut-out circuits at these places, so some other method of restoring the cut-out was necessary. This has been accomplished by fitting a special switch to each engine running to these points. This switch is operated by means of a key. One of these keys is kept at each place where engines lie over and is used to cut out train control before the train leaves the terminal. To protect against improper use, the apparatus is so arranged that the switch can only be operated by a man

standing on the ground with the engine stationary, and it is necessary for the key to be removed from the switch before the cut-out becomes effective. Engines whose runs are confined to the main line only are not fitted with any cut-out device, as the main line is completely equipped for train control and locomotives on these runs remain cut in at all times.

Before taking an engine out on the road the engineman is required to make a departure test of train control equipment to assure himself that it is functioning properly. The departure test is conducted by the engineman himself and consists of energizing the rails under the engine to give an "H," an "M," and finally an "L" indication in the cab and observing that the train control equipment reacts in the proper manner to these indications.

The track space at Camden is limited so it is arranged



Electrical Equipment Box Containing the Train Control Relay and Vacuum Tube Amplifier; the Plate Voltage Dynamotor Is Mounted on Top as Is Also the Main Power Supply Switch Shown at the Right

for the departure test to be taken with the engine standing still on the departure tracks. These tracks are insulated and are wired for track and loop circuits in the same way as the roadway tracks. The controls of these circuits on each track are taken to a motor-driven circuit controller.

This controller is arranged so that after being started by a push button it will change the indication on the engine automatically, and after giving the "L" indication will stop itself ready for the next test.

As each engine returns to the roundhouse, after the completion of its run, it is given a thorough examination by the electricians and pneumatic maintainers who conduct what is known as the "After Trip Test." This test shows the condition of the electrical and pneumatic apparatus and enables incipient troubles to be detected and road failures avoided.

The work of installing the equipment on the locomotives was carried out in the Reading shops under the direction of I. A. Seiders, superintendent of motive power, after which the engines were sent to Camden and final adjustments made to put them in service by the master mechanic's forces at the Bulsom street roundhouse. The installation of the wayside apparatus was carried out by the Union Switch & Signal Company and the railway company's signal forces. The entire work was performed in accordance with the railway company's specifications.

Bridge and Building Association Meets at Buffalo

*Thirty-fifth annual convention held on October 20-22 with
good attendance*

THE American Railway Bridge and Building Association held its thirty-fifth annual convention at Buffalo on Tuesday, Wednesday and Thursday of this week with an attendance of 300 members and guests. A considerable part of the convention party from the west traveled from Chicago via a special train over the Michigan Central, leaving Sunday night and arriving at Niagara Falls Monday morning, where the day was spent in a visit to the falls, and the new Michigan Central bridge across the gorge before proceeding to Buffalo late in the afternoon.

Opening Session

The convention was called to order on Tuesday morning by President J. P. Wood, supervisor of bridges, Pere Marquette, Saginaw, Mich., who introduced F. M. Barker, division superintendent, Lehigh Valley, Buffalo. Mr. Barker welcomed the convention to Buffalo, pointing out that it is essentially a transportation city, the railways being the largest single industry there, and employing about 22,000 men. Buffalo has 14 railroads serving 3,200 industries, while the Buffalo-Niagara Frontier territory embraces 1,500 miles of railway tracks. In conclusion, Mr. Barker stated that, "You men of the bridge and building department have done your full share in keeping the standards of maintenance at a high level, and at as low a cost as possible. While engines and cars have increased in size, requiring heavier bridges and buildings, you men have met the situation by strengthening your bridges and buildings without any great increase in cost, and you have done it in spite of the fact that in the past eight or ten years labor costs have increased practically 100 per cent and material costs over 50 per cent. This has been done very largely by you men getting together for the general exchange of ideas in such organizations as the American Railway Bridge and Building Association."

President's Address

In his opening address President Wood reviewed the developments which have been made in the maintenance of railway structures since this organization was founded, and also emphasized the necessity of keeping pace with progress today. He said that changing conditions had compelled us to change our methods, and that what seemed

good practice only a few years ago is now obsolete. The scarcity of some materials in some sections of the country, and the advent of other materials to take their place, have taught us to economize as well as to change our designs. "Have you and I," said he, "kept pace with the progress of the last few years? Let us take stock of ourselves and answer this question, for to the fleet of foot is the race."

The report of the secretary-treasurer showed a surplus of \$107 for the year. Approximately 60 new members were received.

Other Features

Special features on the program included illustrated addresses on the structures on the Lackawanna, by George J. Ray, chief engineer of the Lackawanna, and on the construction of the Niagara arch bridge by H. Ibsen, bridge engineer of the Michigan Central. Mr. Ray described the standards of bridge and building construction on his road, illustrating his address with numerous photographs of structures, in which he emphasized the reasons influencing their selection of various designs and materials. Mr. Ibsen also used illustrations freely in describing the various steps in the construction of the new bridge across the Niagara gorge, a detailed description of which appeared in the *Railway Age* of November 8, 1924.

Election of Officers

The following officers were elected for the ensuing year on Thursday morning: President, C. W. Wright, master carpenter, Long Island, Jamaica, N. Y.; first vice-president, E. T. Howson, western editor, *Railway Age*, Chicago; second vice-president, F. C. Baluss, engineer bridges and buildings, Duluth, Missabe & Northern; third vice-president, Maro Johnson, assistant engineer, Illinois Central, Chicago; fourth vice-president, J. S. Huntoon, assistant bridge engineer, Michigan Central, Detroit. C. A. Lichty and F. E. Weise were re-elected secretary-treasurer and assistant secretary, respectively. Directors elected were: E. L. Sinclair, assistant engineer, Chicago, Milwaukee, St. Paul, Marion, Ia.; A. I. Gauthier, supervisor of bridges and buildings, Boston & Maine, Concord, N. H.; and O. F. Dahlstrom, bridge engineer, Chicago & North Western, Chicago.

The Future of Bridge and Building Work

By F. H. Alfred
President and General Manager, Pere Marquette, Detroit, Mich.

Yours is an old organization, composed largely of men who entered railroad service as artisans of the early days, or were graduated from carpenters and skilled mechanics, to important leadership. From the beginning master carpenters were a very necessary part of the railroad organization. Thirty-five years in the annals of a nation is a comparatively brief span, but thirty-five years in the history of a railroad is a comparatively long period.

American steam railroad operation as we understand it dates back to August, 1829, when the Stourbridge Lion, imported into this country from England, made its first run on the Delaware & Hudson Company's tramway, two months before Stephenson demonstrated in England the practicability of The Rocket. The Stourbridge Lion was found to be too heavy for the Delaware & Hudson's tramway tracks, making it necessary to discontinue the use

of this locomotive. It might be said then, that your calling dates from that day, which is perhaps a peculiar and a singular circumstance that the birth of a new calling may be fixed to the very day, almost the very hour. So we may also say that the railroad master carpenter was active in designing and maintaining our railway structures from the outset.

As an organization your association reverts to 1890. The Interstate Commerce Commission of the United States had been created three years before and its first chairman, Thomas E. Cooley, the eminent jurist, who was largely responsible for the creation of this body, really gave to the world a new and constructive contribution to an industry which then was playing an important role in the up-building of our nation, and is still functioning to the advantage of our country as a whole.

It seems to me that the birth of the Interstate Commerce Commission was to a certain extent responsible for the creation of the American Railway Bridge and Building Association. The creation of the commission itself marked the raising of the status of the steam railroad transportation industry from a haphazard business to the dignity of a profession, having definite aims and certain defined standards of service. With these definite aims and defined standards came the urgency for specialized study, and so we find the lines of demarcation of the three great groups of employees that are classified under the general term operation become more pronounced, and so we now have these departments—maintenance of way, maintenance of equipment, and transportation. Hitherto, it had been the custom that the man in charge generalized and, in reality, had charge of and guided these three operations. With this crystallization of opinion on management came the engineer maintenance of way and with him the inauguration of the bridge and building department.

These men long identified with the railroad service effected their organization in 1890. The Maintenance of Way Association, as such, is ten years younger.

To a certain extent your association has revived the

ideals and the aims of the trade guilds of earlier days; associations that had as a basis and particular aim the raising of the standard of the craft and, too often, in our modern trend of organization, this point is neglected or even subordinated to other aims. In this way, the industry itself suffers and, as must necessarily follow, the organization identified with the industry as well.

To revert once more to the days preceding the creation of your organization, structures prior to this time were largely of wood. The use of concrete had not come into use. Bridge structures were almost entirely of the Howe truss design. These, of course, required accurate fitting and joining on the part of the artisan.

On the Pere Marquette there are now four general bridge and building foremen, all of whom have been in the service of the company as long as the one who addresses you. I have been intimately associated with these men during the past quarter of a century and the fact that no change is ever made in this department on our railroad is, of itself, conclusive proof of the superior quality of the men in these positions.

To the American Railway Bridge and Building Association is due a great part of the credit for the great strides that have been made in the preservation of timber through treatment. Through these processes, the life of timber has been prolonged twice its natural span. To your association is also due in a large measure, the study and tests that have resulted in the direction of substitutes for timber—in the use of concrete for construction purposes.

It might seem at first blush, that you men have practically worked yourselves out of a position—a phenomenon that is only too well appreciated by the members of the engineering profession. Against taking too dark an outlook, it would seem to me that your association will find that with the years will come new problems to solve. These problems will be even more complicated than they are today, for they will involve greater research to effect greater economies than obtain at present. So the association's importance will take on a new standard.

Importance of Handling Labor Properly

R. E. Woodruff, division superintendent, Erie, Buffalo, N. Y., spoke at the opening session on the importance of bridge and building men giving more attention to the handling of their labor. He spoke in part as follows:

"Labor costs more now than it did years ago, and it is your constant endeavor to build permanently to save maintenance charges. Nevertheless, a certain amount of labor is essential. Analysis indicates that 60 per cent of the money you spend goes for labor, and it is part of your jobs as supervising officers to make that expenditure for labor earn the largest return possible."

Talk to the Foremen

"It is seldom that supervising officers talk to foremen about the handling of men, and so they have nothing but their own experience to guide them. Very often a new foreman makes mistakes. Because he is a good workman his first inclination is to endeavor to get a lot of work done by driving his gang. Also a foreman does not always hire the right kind of men."

"While men differ from each other every man has two or three different moods. An enthusiastic, skilled workman will do at least twice as much work as an unskilled 'Jack of all trades.'

"How should a man be treated? Put yourself in his place. If you were a skilled workman or the foreman of a gang what would make you turn out a lot of work of good quality? In the first place you would like to feel respect for your superior officer. You would also like to feel that he respected you—that he was your friend—that he was back of you—that he would help you if you needed help."

"Men are what you make them. When a foreman says that men are not as good as they used to be years ago, he is simply admitting that he is more or less incompetent. Human nature has not changed in thousands of years, and it is just as possible to have an enthusiastic organization today as it was 30 years ago. The remedy is in our hands. If we expect our men to co-operate with us in carrying out our work we must show by our disposition and actions that we are ready to co-operate with them. As a matter of fact we should make the first move. Men naturally look to their officers for advice and initiative. If you supervisors do all that you can to promote the proper attitude in your organization you will find a hearty response. A proper mental attitude is the cause and enthusiastic co-operation on the part of the men is the effect."

Report on the Use of Precast Concrete Units

The committee communicated with engineers of each of the trunk line railways, asking for data on the precast units in use. Considerable data was thus secured and supplemented by information in the possession of the committee members. There follows a brief discussion of a number of precast concrete units.

Bridge Slabs

Precast bridge slabs are used to some extent by practically all of the larger roads. The one outstanding advantage is the minimum of interference with traffic during construction. The units, being of a safe age when placed, may be subjected to full loads immediately. On a road of two or more tracks, slabs for one track may be placed at a time, and even a single track structure may be placed in the intervals between trains.

Precast bridge slabs may be constructed at a central plant, hauled to the site on flat cars and placed by crane, or they may be cast near the site in which case they may be put in place without being loaded on cars. Where a suitable crane is not readily available the slabs may be cast on falsework in such a position as to enable sliding them into place when cured.

Piles

Although foundation piles are sometimes cast in place precast piles are more commonly used. The length is limited only by facilities for handling. Sometimes they are equipped with jets for sinking but hammering is the usual method and the amount of driving a pile will take without damage is surprising.

The reinforcement usually consists of longitudinal bars and a spiral wrapping. Where the concrete is to be exposed to the weather the importance of anchoring the steel so as to insure a uniformly adequate covering of concrete cannot be emphasized too much. A high quality concrete is also essential.

Where a large number of piles are to be cast for a specific project it is well to prepare a few test piles to determine the length required. They can be cut if needed, however, and it is often the practice to cut away enough of the concrete to expose two or three feet of the reinforcing which is then bent over into the cap.

Culvert Pipe

The use of concrete culvert pipe is standard on practically all trunk line railroads. Some of the larger roads manufacture their own pipe. Others have done so but have abandoned the practice as there are a number of concrete products companies which are in position to furnish pipe of high quality.

Concrete pipe is available in sizes up to 84 in. although the smaller sizes are more numerous. Whether pipe is purchased or manufactured care should be taken to see that a high quality concrete is used with sufficient reinforcing, securely anchored to insure correct spacing. For use under track, be sure the pipe is of railway weight and not a lighter weight pipe designed for highway structures. Because of the cost of first class forms it is economical only for those roads having large requirements to undertake the manufacture of pipe.

Buildings

Watchmen's shanties, telephone booths, small shelters at way stations, oil and tool houses, yard offices and structures to house electrical connections are a few of the buildings which may be cast as a unit and transported to the site ready for instant use. If well made, no

maintenance is required other than of the doors and windows.

Buildings too large to be cast as a unit may be cast in sections and assembled. This practice has been followed in the construction of structures of considerable size. It seems especially advantageous in engine houses where there are a number of stalls all alike, requiring a number of units which may be cast in one set of forms.

Other than economy, the chief advantage of unit construction is the speed with which a building may be erected when everything is ready for the start. When the work must be done around a busy shop or terminal, this advantage becomes of utmost importance.

Concrete blocks deserve more attention than they have received for structures of this type. One block occupies as much wall space as 13 brick. The block wall requires less mortar with a corresponding saving. For thin walls concrete blocks are considerably cheaper than a monolithic wall.

Retaining Walls

There are several types of concrete retaining walls made up of precast units. Probably the most common at present is the crib wall. The increased cost of ties and their short life when used as cribbing are eliminating them from consideration. Concrete units offer an excellent substitute.

There are several types of patented cribbing on the market with certain advantages claimed for each. All consist of stretchers and headers interlocked together. They require but little foundation and may be laid up rapidly. An advantage of a concrete crib wall is that it is both permanent and portable. When being placed on a new fill or unstable foundation its flexibility is an important advantage. The wall may be moved without the loss of any of the units. If no longer needed they may be stored until there is another opportunity to use them. The cost is said to be around 40 per cent to 60 per cent of the cost of a monolithic wall.

Among other advantages is the excellent drainage provided by the open face. Even those types designed to present a closed face permit drainage between units. It is easy to build a wall of medium height parallel and close to a track as one cell may be built at a time, the material for the backfill being obtained from the adjoining cell thus minimizing the handling of material.

Posts and Poles

Among the great variety of miscellaneous units adopted for railroad use fence posts probably stand first in importance. Increased cost and scarcity of good wooden posts, combined with freedom from danger of damage by fire has induced many companies to use concrete posts in great numbers.

Whistle, sign and mile posts of concrete are standard practice on several roads. They are inexpensive and durable. The lettering is recessed and painted.

Telegraph and telephone poles have been less extensively used on steam lines, but there are a few examples all of which are favorable. Electric lines have used quite large numbers of them. The cost does not greatly exceed that of a treated wood pole.

Committee: T. H. Strate, engineer of track elevation, C. M. & St. P., chairman; J. S. Huntoon, assistant bridge engineer, M. C., vice-chairman; C. A. J. Richards, assistant engineer, Penna.; F. E. Taggart, assistant engineer, I. C.; H. R. Leonard, chief engineer, bridges and buildings, Penna.; W. F. Rech, bridge engineer, C. & A.; and L. M. Arms, engineer, Railways bureau, Portland Cement Association.

[In addition to the various types of unit concrete con-

struction enumerated above, the committee's report also covered such items as units for use in the construction of piers, abutments and footings; railing for bridges; conduits; highway crossing slabs; tunnel linings; watering troughs for stock pens; platform curbs; slabs to serve as the support for the ballast under railroad crossings and special units for such purposes as building and platform canopies. The report was concluded with a discussion of the primary considerations involved in the development and operation of central concrete plants for the manufacture of concrete units, the conclusion being that the

local requirements and probable demand for units must be carefully studied before construction is undertaken.—Editor.]

Discussion

The discussion of this report emphasized the necessity of the greatest care to insure that the reinforcement is properly placed and that concrete of the proper quality is used, requiring high class workmanship and adequate supervision. A number of members reported the increased use of a wide variety of pre-cast concrete units.

Report on Electrically Operated Pumping Plants

An ideal water station should be equipped with a pumping unit that will keep the tank full of water at all times with a minimum amount of attention or supervision. The electrically operated station is often well suited to fulfill these conditions and when controlled by a pressure governor float switch located in the tank or other type of automatic control, requires little attention.

The advantages of an electrically operated water station may be: Low first cost, low maintenance, low cost of operation, safety and cleanliness. When considering a new water station the electrically operated unit holds a decided advantage over other methods of pumping in the matter of housing as a complete unit, including control, requires only about 30 per cent of the space occupied by the equipment required for other methods. The average cost of pump, motor and control of a large number of stations in all parts of the United States, using various types of pumps with capacities varying from 100 gal. to 600 gal. per min. is about \$1,100. This will compare favorably with a steam plant or an oil station when the cost of fuel storage is taken into account. The maintenance of a well installed electrical unit is usually low.

While the motors are reliable they are not prime movers and unless provision is made for different sources of power, which is usually impossible, secondary pumping units should be installed. A number of railways follow the practice of leaving in place the original unit as a standby. Others provide oil burners. Unless the storage of water is sufficient to provide for the maximum demand for a period of at least 24 hours, a secondary pumping unit should be installed and kept ready for service. This will provide for the shutting down of the electrical unit for inspection and repairs. It is also possible where ample storage is provided to make arrangements with the power company so that the pump can be operated outside the periods of peak load. Frequently a more favorable rate for power can be secured when this is done. One serious obstacle in the proper maintenance of electrical equipment is the lack of familiarity among the water supply forces with electrically operated equipment. Generally speaking, the electrical maintenance is handled by the mechanical department and not by water service employees while the usual steam and oil engines are regularly maintained by the water service forces.

Operating Costs and Power Costs

The cost of operation of an electrical station depends almost entirely upon the cost of power. The sliding scale basis, the cost per kilowatt hour decreasing in proportion as the amount of current used increases, is universal. In addition, there is usually added a demand or service charge although this latter charge is sometimes omitted. The largest item of saving due to electrical operation is in attendance, practically every installation showing a de-

crease in this item. It is necessary, even with automatic control, to have some attention given to the plant. This can be done by signal maintainers, pump repairers, telephone maintainers or other local employees. A small increase in the salary of the employee is given for this work. The actual average saving per month for 20 representative stations, as shown by reports received, was \$86, due principally to the reduction or elimination of attendance.

In cleanliness the electrically operated station stands supreme. No expense need be incurred for fuel storage, thus doing away with the expense of handling and storing coal, oil or gas.

One disadvantage of the electrically operated outfit, especially in northern latitudes, is the danger of freezing. While the exhaust from a steam plant can be piped to points where necessary to prevent freezing, a small electric heater, a stove or an oil lamp is necessary with the electrical unit. With the float switch type of control, freezing can be prevented by adjusting the limit of draw-off so that the pump will operate every time water is taken from the tank.

Another disadvantage concerns the matter of dependability. Where electric power is used the source is almost always outside the control of the water service forces. Any interruption in the service is liable to cause a serious shortage of water unless secondary units are ready for service or ample storage has been provided.

While the motor drive is being used with every type of pump it is particularly suited to the direct connected centrifugal pumping unit. The pump should be of the double suction, horizontally split casing type, same base to the motor. This type of pump has been improved and can be secured in a wide variety of sizes. While the efficiency of some centrifugal pumps is low when compared with other types the committee feels that its advantages should be considered. Its first cost is low, it occupies little floor space, has few parts requiring repairs, is easily maintained and can be operated over long periods without the necessity of shutting down.

Committee: J. M. Fitzgerald, office engineer, C. of Ga., chairman; E. P. Hawkins, division engineer, M. P., vice-chairman; A. L. McCloy, supervisor water service, P. M.; O. C. Anderson, foreman water service, S. P.; M. P. Blake, superintendent water service, C. N. R.; D. D. Everett, foreman water supply, Erie; F. M. Case, foreman water service, C. & N. W.

Discussion

The discussion of this report indicated that rapidly increasing use of electrically operated pumps and centered largely around the question of the necessity for the retention of the old equipment as secondary unit for emergency use in case of failure of the electrical power. The consensus of opinion found use of old equipment in this way as an insurance feature.

Report on the Prevention of Accidents to Employees

[The Committee on the Reduction of Accidents to Employees presented an analysis of the causes of accidents to bridge and building department employees and offered detailed recommendations with respect to methods for the conduct of work which would make for greater safety of the men. These recommendations covered the design and use of ladders and scaffolds, the handling and storage of materials, the operation of locomotive cranes, the use of hand tools, the operation of motor cars, the use of explosives and inflammables, and the handling of electrical equipment and conductors.

These consisted in large part of specific suggestions or rules for the conduct of the work. The report also included some observations on the problems of promoting safety among employees with particular reference to the reaction of various types of minds to safety work. This part of the report is abstracted below.—Editor.]

An effort to reduce accidents to bridge and building employees will have little effect until every member of the department learns to think in terms of safety and to know that the safe way of working is the only right way. To instill this idea requires safety organization. Except on a few roads the safety work among bridge and building men will be handled with that of the trackmen under the division engineer. An engineering or maintenance of way safety committee will usually have the division engineer as chairman and as members the roadmaster or supervisors, master carpenter or supervisor of bridges and buildings, and a number of foremen and workmen. The officers should hold office continually but the foremen and workmen should change about every six months so as to eventually give all a chance to learn the work.

These committees, which should meet at a regular time each month, will consider the last month's accidents in the department and methods for preventing their repetition. One or two phases of the work should be brought up each month and an effort exerted to lead the foremen and men to express their ideas on safe practices.

Even a casual study of accidents will show that there are certain human tendencies toward or in avoidance of accidents which seem hard to explain. Certain men who may not appear at all careless have been the victims of more than one accident. Others will take foolhardy chances every time they are out of direct control. To reduce the number of accidents among these and certain other types requires earnest study and work on the part of the safety supervisor and the supervisory forces.

A poorly equipped mind is just as dangerous and possibly more dangerous than an unguarded machine or scaffold. These dangerous, ill-equipped minds might be classified in several ways, but primarily they will be unguarded minds of ignorance, the misguided minds, the stubborn minds and the involuntary minds. These four principal types will be briefly reviewed for easy recognition and a study of methods of overcoming the risks that they involve.

Ignorance is the cause of many of the accidents among unskilled workers. A much larger accident rate is found among workers in the first few months of their employment. Some of them have not been properly instructed. Others did not understand their instructions because they did not understand the English language. A worker must not only be told the right way of acting, he must be taught it. Certain men will be found who are actually mentally deficient, but they can be taught such safety habits as to keep from under loads on cranes and away from passing trains.

In speaking of the misguided mind we refer to the mind that does not comprehend accurately from the physical senses such as sight and hearing and that does not get the proper response in the muscles in acting. Defective vision may make a man misjudge the speed of moving machinery or stumble over an obstruction. Physical examinations may find this ailment but often our men are not given such examination. Defective hearing may make a man heedless of warning sounds or shouts. Others may have such a poor sense of balance as to be dangerous to themselves and others when working at heights. Certain men are of such excitable temperaments that a hurried move may cause an accident. In contrast to this is the tired mind and body that gets out of the way of danger too slowly. The safest man is neither too responsive nor too sluggish.

In appealing to men with safety work and other measures, types of stubbornness will be found with which it is hard to deal. When persuasion fails, discipline may be required to cure these offenders.

Committee: F. C. Baluss, engineer bridges and buildings, D. M. & N., chairman; A. O. Ridgway, chief engineer, D. & R. G. W., vice-chairman; F. A. Dever; B. S. Mace, superintendent insurance, B. & O.; H. A. McElhinney, bridge and building master, C. N.; P. H. Carlson, supervisor bridges and buildings, I. C.; D. Rounsville, assistant chief engineer, C. & N. W.; C. J. Scribner, assistant engineer scales, C. B. & Q.; J. S. Sharp, engineer maintenance of way, Sou., and G. E. Thomas, engineer of bridges, A. C. L.

The Treatment of Water for Locomotive Use

By R. C. Bardwell
Superintendent Water Supply, Chesapeake & Ohio, Richmond, Va.

[This paper comprised a review of the entire subject including an elementary but unusually clear statement of the principles of water treatment and the economies to accrue from it. As this subject has frequently been discussed in detail in these columns, the abstract given below is limited to those portions of the paper which comprise Mr. Bardwell's conclusions.—Editor.]

Treatment

Water treatment of some kind is probably as old as steam boilers. The oldest and probably best advertised water treatment is the addition of boiler compound or chemicals, such as soda ash, direct into the engine boilers

or tanks. This process has been improved and cases where the material is added in solidified form which dissolves slowly, either in the boiler through the washout holes, or in engine tanks, and in some cases, in the roadside tank or pump discharge line, have shown good results on water of moderate hardness. The disadvantage appears to be largely in the lack of a dependable system for checking the regularity and properly proportioning the treatment. With careful supervision and close and systematic check, it can be made to give satisfactory results, but it has the disadvantage of producing acute foaming conditions with the incident interference with train movement, where the concentration in the boiler is not main-

tained within workable limits by frequent blowing down, so that it is held in bad repute in many localities.

Some experimenting is being done with zeolite softening at the present time on the western coast. This system provides for running the raw water through a filtering medium which has an interchangeable base; that is, the filter absorbs the scale-forming elements and replaces them with non-scale-forming alkali salts. At specified periods the filter is regenerated by soaking in strong brine solution. The experience with this system in this section has shown it to give ideal service for laundries and similar industries but the excessive alkalinity produced with the resultant foaming and the high cost for pre-filtration and the salt regeneration have retarded its use for steam boiler service.

The standard and complete method of complete water softening consists of the addition of lime and soda ash to the water in predetermined amounts at wayside settling tanks. Its object is not only to soften the water but also to remove the precipitated sludge with other mud or suspended matter, so as to deliver the water to the boilers not only soft, but clear. Common lime and soda ash are used for the reason that they are the lowest priced chemicals which can be obtained to do the work efficiently and economically. The types of plants vary not only with the patented proportioning equipment on the market, but also with the designs prepared to handle the local and individual conditions best. With proper attention and supervision, experience has shown that decidedly satisfactory results can be obtained in the way of scale and pitting elimination and that the economies effected usually far exceed the estimate.

Offers Marked Savings

It seems needless to say that any of the various impurities in water will cause trouble contingent upon the

amount and kind. Removal of such impurities is certain to show improved results, dependent upon the amount removed. There is no question but that, with proper treatment of the water, scale and pitting conditions with their incident boiler maintenance expense, can be very largely eliminated and that the fuel consumption in clean and dry boilers is much less than with leaky or badly scaled power. In addition, the large intangible benefits, such as elimination of engine failures on the road and the reduction in delays to traffic and train movements, usually far outweigh the tangible savings in fuel consumption and boiler repairs.

The wide range of the problem of railway water treatment, including the design and installation of plants as well as the individual studies of the water quality and the check of actual treatment and its effect upon transportation and train movements, well warrant the special study which is being given to it on many roads. In the handling of this problem it is necessary to have the closest co-operation of the engineering, maintenance, motive power and operating departments to secure the best results. The best mechanical facilities will function only in a perfunctory manner or fail entirely if not followed up by a careful check system, and it has been found that an organization with a definitely fixed responsibility is the first essential to successful results in water treatment.

Discussion

A number of members describe their difficulties with the disposal of the sludge from water-treating plants, finding it difficult to handle where no stream was adjacent. C. R. Knowles (I. C.) told of the demand which the Land Development department of his road had stimulated among the farmers in the use of this sludge as fertilizer on their land, with the result that its disposition is no longer a problem.

Report on the Relative Merits of Steel and Wood Sash

Steel sash includes solid steel sash, hollow metal sash or a combination of these types. Solid steel sash with ventilators are being used extensively for large terminal buildings of fireproof construction. Solid rolled steel, continuous top-hinged, monitor sash has a storm panel at the ends of each operating run. By the use of mullions any desired opening can be obtained. In the case of side walls the window openings in large buildings are generally made to fit uniformly between pilasters or supporting columns in steel frame construction.

The intersection of the horizontal and vertical muntins of solid steel sash is formed by a dovetailed miter interlocking the bars so they run continuously from the head to the sill and from jamb to jamb of units. This construction offers the maximum strength against wind pressure and vibration.

For hollow metal windows the jambs, heads and sills are constructed so there will be no openings or holes entering the hollow chambers that would permit moisture to enter and start corrosion from the inside. The sills are reinforced with a subsill of galvanized sheet iron, with walling-in flanges on the jambs and water bars on the sills. These sash are mounted in frames between double weather stops, stops being adjustable so that they may be placed in the closest relative position with respect to the sash.

Metal sash is installed in a prepared opening in the wall. Offset jamb construction is essential for single unit openings, and is very desirable when multiple units are to be used as it facilitates installation. Being usually

ordered from stock it is made to fit into walls without a special frame. For one-story shop buildings covering a large area, one of the best methods of daylighting and ventilating is to use the sawtooth roof construction with steel top hung sash.

Sawtooth steel skylights have operating sash by which the upper section, when hinged at the top, can be opened for ventilation. With this type the ventilating feature does not interfere with the daylighting. Instead of having a spotty outflow due to individual openings which causes an irregular distribution of fresh air, a uniform distribution can be obtained by operating the roof sash simultaneously in groups by electric motors and by providing corresponding uniform inlets in the sidewalls by means of continuous sash. Where considerable daylight is required, free from shadows and direct sunlight, this type gives adequate service.

With operating devices monitor sash is made in the pivoted, continuous center pivoted or continuous top hung types for use in railroad buildings. Hollow metal sash is made as a double hung, hinged in, stationary standard pivoted, double pivoted or a combination of these types; also with a vertical and horizontal swing of one or both sashes. All sash are made with dies which insure the fitting of every member when assembled and welded at the joints. This construction assures a warmer building, being built of hollow section with continuous air spaces and eliminates condensation and affords the maximum of light.

Wooden sash used in frame, brick, frame and stucco,

and concrete block buildings may be of white pine, cypress or redwood, depending on the section of the country in which they are located. Frame buildings, which are the ordinary type of railway buildings of non-fireproof construction, have a rigid opening for the installation of the sash frame. This frame as well as the sash should be made of thoroughly dried lumber to avoid shrinkage which would otherwise occur. The frame opening should be of sufficient size to allow the sash frame to be set plumb, facilitating the easy operation of movable sash.

In the average railroad building wooden sash will generally be double hung, if in sidewalls, and probably center pivoted if used in the roof. Under unusual ventilating conditions the smoke and gases must pass out of the highest part of the building. Center pivoted sash do not permit easy egress.

Motor wooden sash should be either pivoted, continuous center pivoted or continuous top hinged with proper sash opening devices to give best results. In machine shops wooden sash operating devices can be of the worm and gear type turning a rocker shaft, to which are attached arms that in turn act directly on the sash through suitable rods. A rack and pinion gear is used primarily for long runs of heavy hinged-top sash. The direct horizontal thrust given to the sash prevents harmful strains.

By the use of copper weather stripping, wood sash can be made weather tight when closed, which saves heat and excludes dirt and dust. This is used on windows of depots and office buildings in sections where cold winters occur.

Sash pulleys should be quickly detachable, galvanized finished, specially bushed and noiseless. Either sash cord or chain can be used with cast iron sash weights. The use of the above will facilitate the easy operation of sash in the different types of buildings. Wooden frames possess an advantage in that they make it easy to apply curtains, storm sash and screens.

Conclusions

Wooden sash can be used economically in buildings where the inside temperature is more or less uniform and where smoke, gases and moisture are present, which have a deteriorating effect on steel sash.

In frame, and stucco, concrete block and brick buildings

where the use of shades, screens and storm sash are necessary, wooden sash allow the easy installation of fastenings. For all other types of buildings steel sash is well adapted for use and has the additional advantage of fireproof construction.

Steel sash used in engine houses or power houses should be scraped and painted at least every other year to overcome the deterioration resulting from the effect of smoke and gases.

A maximum glass area is provided by the use of steel sash. It reduces fire hazard but its protection becomes ineffectual when the glass melts.

Painting wooden sash is not required as often as for steel sash.

Since the quality of lumber for sash purposes is diminishing, wooden sash will require a substitute which will be a new type of metal sash with frame.

Shrinkage, which is typical of wooden sash and casings is entirely eliminated by the use of metal sash, hence buildings are easier to heat in winter as well as easier to ventilate, for ventilators can be opened regardless of weather conditions.

For general use in various buildings, sash of extra heavy white pine, well painted and glazed, with good putty, will make an economical installation.

Committee: F. N. Graham, assistant engineer, D. M. & N., chairman; A. T. Hawk, engineer buildings, C. R. I. & P., vice-chairman; P. Aagaard, general building inspector, I. C.; F. H. Masters, assistant chief engineer, E. J. & E.; and J. D. McMahon, architect, G. N.

Discussion

The discussion on this report indicated that it was the practically unanimous opinion that wood sash is more economical than steel sash for roundhouse construction where the attacks of moisture and gases are severe, although F. C. Baluss (D. M. & N.), described a roundhouse built seven years ago in which steel sash were used in the vertical walls at the ends of the stalls, and wood sash in a saw-tooth roof. All of the steel sash are still in good condition, while the wood sash are now being entirely replaced. As a result of this experience he stated that if he were to erect another building of this type he would use steel sash throughout. He emphasized the necessity, however, of keeping the steel well painted.

Report on Methods of Handling Minor Jobs of Maintenance Work

The size of jobs to be classed as minor will be those which can be done with four or less men. Minor jobs can be divided into two general classes: viz. (1) those which can be deferred until the regular bridge or carpenter crew on its routine trip arrives, and (2) those which are of an emergency nature and require immediate attention.

Emergency minor jobs, such as broken window-glass, plumbing defects, failures in heating plants or water and coaling stations, broken locks and doors, broken planks in floors, platforms or sidewalks, are a source of annoyance and need prompt attention. Where the territory is fairly concentrated and train service frequent, special men aside from regular crews, might be used. The men should be trained to keep in touch with headquarters constantly so that they can be reached quickly. However, where the territory is widely scattered and train service infrequent, it may be expensive to send out men from gangs or headquarters.

The question then may well be asked: "Why not arrange with local contractors to care for these small jobs?" Answers to a questionnaire from 28 railroads, showed that

13 make a regular practice of arranging with local contractors to care for minor jobs; 8 do it occasionally and 7 do it not at all.

Some Suggestions

The possibility of having a list of local parties on whom the agent can call to do odd jobs should receive serious thought and be utilized whenever possible and when not in conflict with labor board rulings. Standardization of parts such as locks, size of window panes, doors, types of valves, plumbing, and, in fact, construction in general will tend toward economy in making repairs. With uniform standards there will be less repair parts to carry on hand. When defects are reported there will not be so much doubt as to the quantity and kind of material to take.

Wisdom must be exercised in choosing men who are detailed to care for minor jobs. They should be ingenious and dependable. Co-operation with forces of other departments will be of valuable assistance. Some bridge men object to section men shimming under rails on bridges when the track heaves. This is a questionable objection.

Section men can easily make a poor condition safe in this way. Any such temporary repairs should be reported to bridge crews so they can be checked up and corrected if need be and explanation made, if wrong.

Work of other departments should be noticed to see that it does not create conditions which will result in frequent minor repairs. Their use of facilities should be watched. Shop and roundhouse employees will frequently permit warm water to run on to floors, throw waste and refuse into drains, turn live steam into wrong places in sewers and drains, resulting in its backing into down-souts, causing them to rust, etc. Penstock locks are frequently knocked off by trainmen because a key is not handy. Penstocks are frequently pulled down because the engine is moved before the penstock is swung clear. Coal chute aprons are knocked off because engines are started too soon. The improper surfacing of track by section men frequently requires a bridge to be raised.

Consideration should be given to permitting men sent out to make emergency repairs to purchase small articles locally, possibly arranging for the agent to pay for them. Usually local dealers will charge the account to the railroad and send in a bill to the proper officer.

Periodic reports of work done should be made to the supervisory office. These should be studied to see that the correct method was used. The performance should be scrutinized for possible improvement in future procedure. Some officers when sending men out to do a job indicate what they consider a reasonable time to complete

it. The determination of the proper method to use in handling any work is based upon the cost and value of the result. Such costs must be subject to comparison.

The many varying conditions under which maintenance work is done makes it difficult to obtain comparable costs. No general rule for economical handling of minor maintenance jobs can be evolved unless it be that the supervisory forces must exercise good judgment based upon past experience and be on the alert at all times, keeping in mind the necessity of efficiency and economy, harmonious co-operation with other departments and possession of the good will of their subordinates.

Committee: F. W. Hillman, division engineer, C. & N. W., chairman; R. C. Henderson, master carpenter, B. & O., vice-chairman; A. M. Swenson, assistant superintendent bridges and buildings, M. St. P. & S. S. M.; W. J. H. Manning, assistant engineer maintenance of way, D. & H.; R. G. Heck, assistant engineer, C. M. & St. P.; G. C. McCue, supervisor bridges and buildings, C. N. R.; and F. M. Griffith, supervisor bridges and buildings, C. & O.

In discussing this report A. I. Gauthier, Boston & Maine, described the system in effect on that road, whereby much small maintenance work is contracted through local mechanics with marked economy. Agents are encouraged to report such work direct to supervisors without going through the division superintendent's office, thereby expediting its handling. P. N. Nelson, Southern Pacific, described the practice of that road of stationing district carpenters at intervals of 35 to 70 miles, who constantly move back and forth over their territories with outfit cars, making small repairs.

Supply Manufacturers Present Exhibit

A total of 50 firms were represented in an exhibit of bridge, building and water service equipment and materials in a room adjoining the convention hall under the auspices of the Bridge and Building Supply Men's Association. The officers of this association during the past year were: President, A. J. Filkins, Paul Dickinson Co., Chicago; vice-president, D. J. Higgins, American Valve & Meter Co., Chicago; treasurer, J. E. Nelson, Joseph E. Nelson & Sons, Chicago; secretary, B. J. Wilson, Pocket List of Railroad Officials, Chicago. Directors: D. Hultgren, Massey Concrete Products Co., Chicago; O. T. Snow, T. W. Snow Construction Co., Chicago; W. D. Waugh, Detroit Graphite Co., St. Louis, Mo.; J. W. Shoop, The Lehon Company, Chicago; F. M. Condit, Fairbanks, Morse & Co., Chicago, and H. C. Brown, Chicago Bridge & Iron Works, New York.

The firms which were represented, together with the materials and devices shown and the names of their representatives follow:

List of Exhibitors

American Hoist & Derrick Co., St. Paul, Minn.; literature; W. L. Manson.

American Railway Hydrant and Valve Co., Stapleton, N. Y.; valves; W. Volkhardt.

American Valve & Meter Co., Cincinnati, Ohio; model of universal telescopic spout and water column; J. T. McGarry and D. J. Higgins.

Asbestos Shingle Slate Sheathing Co., Ambler, Pa.; asbestos shingle, asbestos corrugated sheathing, asbestos building lumber, partition board and ebonized asbestos lumber; I. B. Blain, G. E. Strelbel and F. C. Weber.

Barber Asphalt Co., Philadelphia, Pa.; C. O. Dowell and G. D. Fowle.

Barrett Co., New York; literature; F. S. Nichols and B. S. Schmehl.

Beaver Products Co., Inc., Buffalo, N. Y.; roofing, wall board and plaster; H. M. Butters.

Carter Bloxonend Flooring Co., Kansas City, Mo.; built up wood block flooring, literature and photographs; A. E. Giese and L. L. Bucklew.

Celotex Company, The, Chicago; photographs, literature and samples of wall board; G. R. McVay.

Chicago Bridge & Iron Works, Chicago; photographs and literature; E. P. Shelton.

Cleveland Pneumatic Tool Company, The, Cleveland, Ohio; hammers, riveters, wood and metal boring drills, rock drills, and concrete breakers, air valves and hose couplings; B. H. Tripp.

Cook, Inc., A. D., Lawrenceburg, Ind.; deep well equipment; C. O'Brien and J. F. Freeman.

Detroit Graphite Company, Detroit, Mich.; literature; L. F. Flanagan, W. D. Waugh, A. B. Edge, J. R. C. Hintz and J. F. Neiman.

Detroit Steel Products Company, Detroit, Mich.; R. S. Bishop and S. M. Hathaway.

Dickinson, Paul, Inc., Chicago; models of cast-iron camp car jack, ventilators and chimneys for small buildings; A. J. Filkins and C. Wm. Hansen.

Dixon, Joseph Crucible Co., Jersey City, N. J.; graphite products; H. A. Nealley and J. C. Kemp.

Duff Mfg. Co., Pittsburgh, Pa.; jacks; E. A. Johnson and C. N. Thulin.

Fairbanks, Morse Co., Chicago; literature; F. M. Condit, B. S. Spaulding, E. C. Golladay, A. J. Olson, E. E. Pendray, H. E. Vogel, E. P. Chase and C. T. Fugitt.

Fairmont Railway Motors, Inc., Fairmont, Minn.; literature; W. D. Brooks and E. R. Mason.

Hastings Signal & Equipment Co., Boston, Mass.; automatic tell-tale hanger and replacer; B. J. Hastings, J. E. Freeling and H. H. Naylor.

Highgrade Mfg. Co., Cleveland, Ohio; literature and samples of roofing cement; S. A. Baber and J. N. Kinn.

Jenkins Bros., New York City; valves, gage glasses and car heating gaskets; Chas. B. Yardley.

Jennison-Wright Co., Toledo, Ohio; literature; T. B. Fogg and F. W. Cherrington.

Johns-Manville, Inc., New York; samples of roofing, pipe and boiler insulation, packing, shingles, corrugated siding and roofing waterproofing and industrial flooring; P. C. Jacobs, W. H. Lawrence and R. P. Townsend.

Jones Paint Co., The, Rome, N. Y.; A. D. Jones.

Kaustine Company, Buffalo, N. Y.; literature; G. Carrington, Jr., Chas F. Smale and D. A. Evans.

Kentucky Rock Asphalt Co., Louisville, Ky.; samples of rock asphalt, photographs and literature; W. F. Pollard.

Lehon Co., The, Chicago; samples of roofing and shingles,

waterproofing and roof coatings; Tom Lehon, J. W. Shoop, J. T. Carpenter and R. C. Chissom.

Lowe Bros. Co., The, Dayton, Ohio; L. Ingraham.

Massey Concrete Products Corp., Chicago; literature; Chas. Gilman, D. A. Hultgren, Paul Kircher and W. L. McDaniel.

Murdock Manufacturing & Supply Co., Cincinnati, Ohio; hydrants, railway water service box and drinking fountains; J. C. Endebeck.

National Lead Company, New York; literature; Charles L. Haas, A. H. Sabin, W. S. Carlisle, F. E. Dodge and F. M. Hartley, Jr.

Nelson & Sons, Joseph E., Chicago; literature; John E. Nelson and Wm. H. Nelson.

New Jersey Zinc Sales Company, New York; down spouts, gutters and roofing; R. G. Kenly.

Norton, A. O. Inc., Chicago; bridge jacks; R. J. McKay and H. W. Wilson.

Patterson & Co., W. W., Pittsburgh, Pa.; tackle blocks; W. W. Patterson, Jr.

Patterson-Sargent Co., Cleveland, Ohio; L. J. McCombs and W. H. McBride.

Pocket List of Railroad Officials, New York City; publications; H. A. Brown and B. J. Wilson.

Railway Age, New York City; copies of *Railway Age*, Railway Engineering and Maintenance and books; E. T. Howson, F. C. Koch, J. M. Rutherford and J. G. Little.

Railway Review, Chicago; copies of paper; George E. Boyd and W. H. Dickinson.

Redwood Manufacturing Assoc., San Francisco, Cal.; B. F. Wade.

Robertson & Co., Wm., Chicago; model of culvert; R. F. Repasz, Sherwin-Williams Co., Cleveland, Ohio; literature and samples of paint; S. R. Fraser.

Sipe & Co., James B., Pittsburgh, Pa.; D. B. Vail and R. M. Smith.

Snow Construction Co., T. W. Chicago; literature; V. L. Walker.

Templeton Kenly Co., Ltd., Chicago; bridge jacks; G. L. Mayer and A. C. Lewis.

U. S. Wind Engine & Pump Co., Batavia, Ill.; literature; represented by C. E. Ward.

Woolery Machine Company, Minneapolis, Minn.; literature; J. T. Stephenson.

Zitterell Co., W. J., Webster City, Ia.; photographs; represented by G. C. Mills.

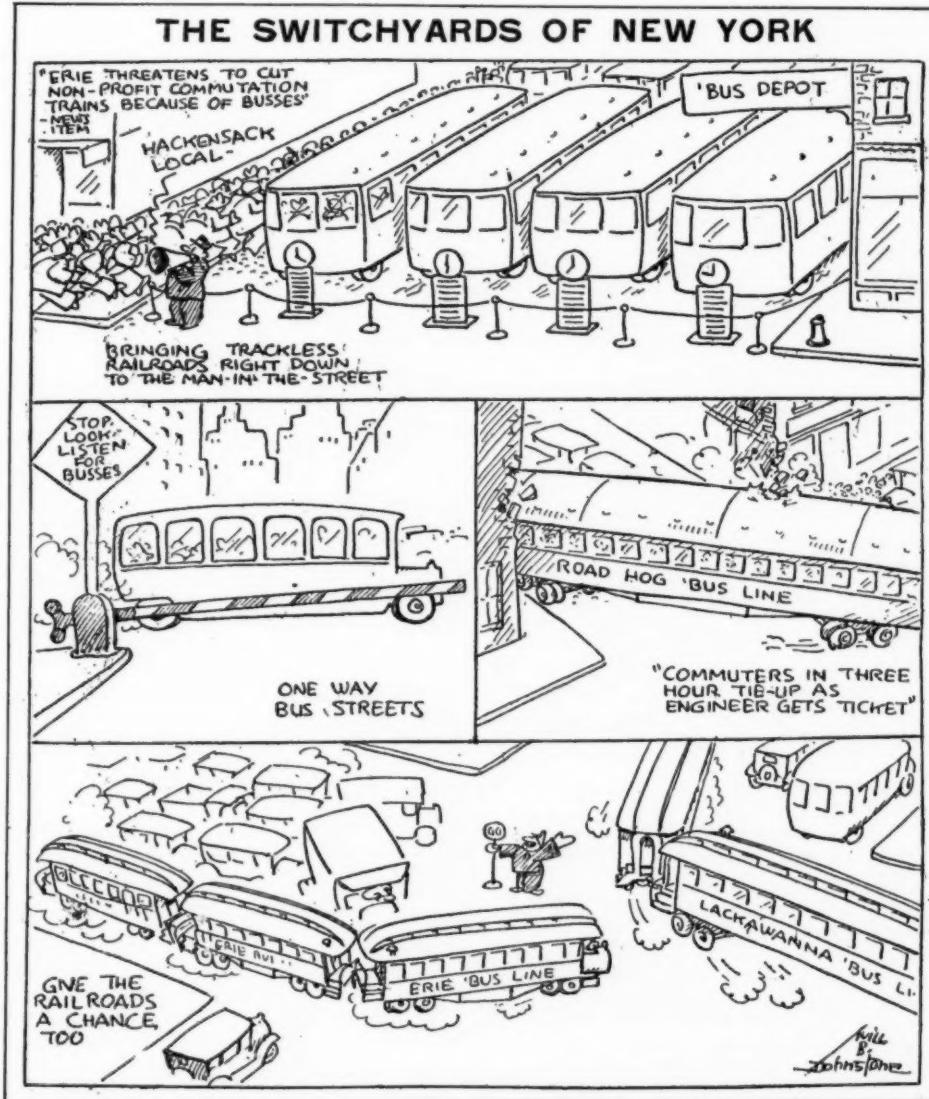
Election of Officers

At the annual election of the Bridge and Building Supply Men's Association on Thursday morning the following officers were elected for the ensuing year: President, D. J. Higgins, American Valve & Meter Company, Chicago; vice-president, John E. Nelson, Joseph E. Nelson & Sons, Chicago; treasurer, Ben J. Wilson, Pocket List of Railway Officials, Chicago; secretary, Fred M. Condit, Fairbanks, Morse & Co., Chicago, Illinois.

The members of the Executive Committee are R. F. Repasz, William Robertson & Co., Chicago; David A. Evans, Kaustine Company, Reading, Pennsylvania; W. D. Waugh, Detroit Graphite Company, St. Louis, Missouri; John W. Shoop, the Lehon Company, Chicago; D. Hultgren, the Massey Concrete Products Company, Chicago; and O. T. Snow, the T. W. Snow Construction Company, Chicago, Illinois.

IN MASSACHUSETTS a railroad company, paying taxes the same as other citizens, finds that of every dollar thus paid, nearly one fifth is expended on the highways. This was stated by a representative of the Boston & Maine at a recent conference on taxation. The total of highway expenditures in the State in 1923 was \$45,000,000, of which motor vehicles paid only \$20,000,000 leaving 25 millions to be borne by general taxation, a sum which equals nearly or quite 20 per cent of the total taxes collected. The Boston & Maine pays, in that state annually, about \$1,500,000; so that nearly \$300,000 of its money is used to aid its auto-bus competitors by furnishing them with free roadways.

A GROUP INSURANCE PLAN has just been closed in Ottawa whereby the Canadian Brotherhood of Railway Employees will provide protection for the thousands of its members in the Metropolitan Life Insurance Company, whose head offices are in New York City. The total amount of the insurance is expected to reach \$15,000,000, and the number of men who will ultimately take advantage of this insurance will be about 15,000. The insurance will be contributory on the part of the railway employees who will be insured for amounts ranging from \$500 to \$1,000 on the basis of a monthly rate of pay. The insurance will be handled at cost, and any profits that are made will be returned to the Brotherhood. The details of the plan are now being worked out in Ottawa by A. R. Mosher, president of the brotherhood, M. Maclean, secretary-treasurer, and A. F. C. Fiske, head of the Canadian branch of the Metropolitan Life Company.



From the World (New York)

General News Department

At the November meeting of the New England Railroad Club, to be held in Boston on November 10, John E. Armstrong, assistant engineer, Canadian Pacific, will present a paper on "Activities of the American Railway Engineering Association."

At the meeting of the Cincinnati Railway Club to be held on November 18, C. A. Radford, publicity agent of the Cleveland, Cincinnati, Chicago & St. Louis, will deliver an address on general railroad conditions. This will be the annual meeting of the club; officers will be elected and a turkey dinner served to those in attendance.

In response to a letter from W. J. Harahan, chairman of the railroads' train control committee, urging a postponement of the effective date of the second train control order requiring the installation on the second division of the original 45 roads, the Interstate Commerce Commission has declined to entertain a blanket petition; but this does not prevent the filing of petitions by individual roads.

The Bureau of Locomotive Inspection of the Interstate Commerce Commission in September inspected 6,556 locomotives, of which 2,835 were found defective and 302 were ordered out of service, according to the Interstate Commerce Commission's monthly report to the President on the condition of railroad equipment. The Bureau of Safety inspected 120,242 freight cars, of which 4,705 were found defective, and 2,175 passenger cars, of which 30 were found defective.

Violation of the hours-of-service law was the charge against the Long Island Railroad in a suit in the United States Court at Brooklyn, N. Y., on October 8, when the railroad company pleaded guilty and paid \$70 in fines. The suit was based on 14 instances, on May 13 and 14, of telegraphers working longer hours than allowed by law. Counsel for the road stated that these were cases where operators worked overtime because of the absence of others, musicians, at a patriotic celebration.

Economics of Automatic Stop and Speed Control of Trains is the subject of a paper to be read before the Engineers' Club of Philadelphia (1317 Spruce street), on the evening of November 17, at 7 o'clock, by A. H. Rudd, chief signal engineer of the Pennsylvania. It is expected that the address will be followed by general discussion on the part of railroad officers who are interested in the subject. To all such men the club extends an invitation to be present.

A Correction

S. A. Witt, Detroit Lubricator Company, Chicago, was elected secretary-treasurer of the General Foremen's Association of Railway Supply Men, instead of E. J. Fuller, Hunt-Spiller Manufacturing Corporation, South Boston, Mass., as incorrectly announced on page 539 of the September 19 *Railway Age*.

Strike of Telegraphers on the Atlantic Coast Line

The Order of Railway Telegraphers started a strike on the Atlantic Coast Line on October 19, ordering all members to stop work at 4 p. m.; but the railroad company issued a statement at 10 p. m. saying that, except in Florida, very few men had left their desks. From Jacksonville, Fla., it was reported that about 250 operators had struck. A memorandum issued by the road on the 21st said that both passenger and freight trains were moving as usual.

A statement issued by an officer of the road said that, following a series of conferences lasting several weeks, the Labor Board issued a decision which did not please the telegraphers, and that the union refused thereafter to continue consideration of individual cases as directed by the Board, and broke off negotiations. The railroad company offered to go a second time before the

Labor Board, but this offer was refused. The Board then sent three of its members to the headquarters of the road, and hearings were conducted at Wilmington.

Railway Electrical Engineers to Meet in Chicago

The sixteenth annual convention of the Association of Railway Electrical Engineers will be held next week in Chicago at the Hotel Sherman. The sessions will begin on Tuesday, October 27 and will continue until Friday, October 30. The mornings will be devoted to the presentation of committee reports and the afternoons to the inspection of the large exhibit of electrical equipment which will be furnished by the Railway Electrical Supply Manufacturers' Association. The exhibits this year are expected to be more numerous than they have ever been before, there being 59 different companies appearing in the list of exhibitors.

The Geneva Derailment—Correction

The derailment of a fast passenger train of the Lehigh Valley at Geneva, N. Y., on October 5, imperilling scores of lives, was not due to the locomotive striking an automobile, as reported. The automobile, in which were the three state troopers, ran violently into the side of the train (the tender). The engineman did not know that anything had hit the train until after he had stopped. An officer of the road reports that the automobile, moving at a high rate of speed, passed several other automobiles which were standing at the crossing, waiting for the train to go by; and some of the occupants of the standing cars shouted warnings, which were unheeded. So great was the speed of the automobile that parts of it were forced under the rear truck of the tender. Only four of the cars in the train left the rails. No passengers were injured.

Hearing on Extensions in Pacific Northwest End

The hearing on application of the Southern Pacific and the Great Northern and Northern Pacific for permission to construct extensions in central and southern Oregon and northern California, which began before the representative of the Interstate Commerce Commission at Portland, Ore., on October 5, ended on October 14. December 1 was set as the date before which briefs in the case must be filed. The arguments will be heard at some later time. As reported in the *Railway Age* of October 17, the Southern Pacific is asking permission to build from Klamath Falls, Ore., on the new Natron cutoff, southeast to a connection with the Nevada-California-Oregon, which it controls, at Alturas, Cal. The Great Northern and Northern Pacific, through their subsidiary, the Oregon Trunk, are applying for permission to construct an extension from Bend, Ore., southwest to Klamath Falls.

The Western Maryland Strike

The voting of the enginemen and firemen on the Western Maryland, reported in the *Railway Age* of October 10, page 668, resulted in a strike on October 15, which is said to have been participated in by between 400 and 500 men; but full passenger train service appears to have been maintained and the officers of the road declared that a very considerable percentage of the freight traffic was moved. The dispute was taken up by the Railroad Labor Board on its own motion on the 16th.

On the 21st, the Board directed the company and the leaders of the brotherhoods to resume conferences, looking to the termination of the strike, declaring that both sides ought to make concessions. This action of the Board was unanimous.

Published statements give little information about the real details of the differences between employer and employees, but an increase of five per cent in pay, said to be necessary to make the rates correspond to those which have been adopted on the New York Central Lines, appears to be the main point.

The road has asked the Labor Board to dismiss the case assert-

ing that service is not suffering, passenger service being maintained 100 per cent and freight service approaching this ratio. This motion has been taken under advisement.

Railroad Money Earns Less Than Three Per Cent

The Central of Georgia, continuing its regular newspaper advertising campaign, prints this month in the local press a brief discussion of the present railroad situation, as viewed from the financial standpoint. The statement says, in part:

"The railroads are handling a record breaking volume of traffic so promptly and adequately that railroad earnings have shown gains during recent months, tending to create the impression that the owners of the railways have profited largely. As a matter of fact, by expanding their capacity to meet the growing needs, the

railroads have incurred obligations which place their owners in a position considerably less favorable than that which they occupied prior to the World War.

"Efficiency and economy in operation are largely due to the investment of large sums in property improvements. The Central of Georgia has, since 1916, spent on improvements to the road and on equipment a total of \$17,187,000. In 1916, the net railway operating income was \$4,081,000. In 1924 it was \$4,556,000. That is to say that, after investing more than seventeen million dollars, the net return showed a gain of only \$475,000, a sum that is less than three per cent of the increased amount invested. The owners of the property would have received more last year had they placed the money in a savings bank at four per cent.

"The railroads of the country (Class I) in spite of their large investments for improvements and in spite of increased efficiency

OPERATING REVENUES AND OPERATING EXPENSES OF CLASS I STEAM ROADS IN THE UNITED STATES.

(FOR 191 STEAM ROADS, INCLUDING 16 SWITCHING AND TERMINAL COMPANIES)

FOR EIGHT MONTHS ENDED WITH AUGUST, 1925 AND 1924

Item	United States		Eastern District		Pocahontas Region		Southern Region		Western District	
	1925	1924	1925	1924	1925	1924	1925	1924	1925	1924
Average number of miles operated ..	236,644.88	236,234.99	59,407.09	59,546.19	5,531.34	5,532.63	38,533.59	38,354.33	133,172.86	132,801.84
Revenues:										
Freight	\$403,311,376	\$358,511,414	\$178,491,391	\$152,930,624	\$20,787,725	\$16,886,395	\$51,235,447	\$45,128,174	\$152,796,813	\$143,566,221
Passenger	a 103,960,941	b 104,553,124	53,018,257	53,904,387	2,207,354	2,343,005	14,160,434	12,777,216	34,574,896	35,528,516
Mail	7,650,487	7,815,282	2,916,911	2,953,267	187,367	188,144	1,112,634	1,079,574	3,433,575	3,594,297
Express	10,573,339	10,177,309	4,883,025	4,361,110	231,918	232,084	1,383,167	1,127,129	4,075,229	4,456,986
All other trans'n	17,372,919	16,382,759	10,053,931	9,373,165	217,560	216,918	9,34,854	848,093	6,166,574	5,944,583
Incidental	11,950,031	10,541,757	5,690,086	5,209,291	356,833	332,226	1,128,758	920,758	4,774,397	4,079,482
Joint facility—Cr.	846,791	745,279	271,029	339,781	11,792	16,528	135,840	118,163	428,130	270,807
Joint facility—Dr.	299,309	221,106	d 3,358	103,893	1,948	2,116	34,385	31,984	266,334	83,113
Ry. operat'g revs.	555,366,575	508,505,818	255,327,988	228,967,732	23,998,601	20,213,184	70,056,706	61,967,123	205,983,280	197,357,779
Expenses:										
Maintenance of way and structures	77,486,514	73,026,188	33,818,612	29,769,270	3,604,649	3,090,344	10,063,958	9,144,181	29,999,295	31,022,393
Maint. of equipm't	105,499,783	101,552,114	50,120,109	46,777,881	5,287,984	5,225,003	13,591,140	12,955,008	36,500,550	36,594,222
Traffic	8,981,027	8,143,091	3,416,509	3,123,446	221,543	226,811	1,525,610	1,385,025	3,817,365	3,407,809
Transportation	178,963,154	173,795,746	83,662,660	81,474,885	5,978,308	5,683,806	22,987,164	21,608,662	66,335,022	65,028,393
Miscel. operations	4,919,966	4,499,191	2,128,560	2,059,430	82,809	80,163	502,089	348,279	2,206,508	2,011,319
General	14,297,884	13,835,725	6,302,766	6,177,876	417,574	436,852	1,860,325	1,828,799	5,717,219	5,392,198
Transportation for investment—Cr.	1,278,770	1,180,872	155,895	138,328	106,361	41,300	299,643	92,896	716,871	908,348
Ry. oper'g exps.	388,869,558	373,671,183	179,293,321	169,244,460	15,486,506	14,701,679	50,230,643	47,177,058	143,859,088	142,547,986
Net revenue from railway operations	166,497,017	134,834,635	76,034,667	59,723,272	8,512,095	5,511,505	19,826,063	14,790,065	62,124,192	54,809,793
R'way tax accruals	32,715,545	30,410,693	14,317,765	12,785,316	1,315,507	1,227,209	4,561,958	3,812,781	12,520,315	12,585,387
Uncollectible r'way revenues	155,038	169,199	88,940	71,515	7,196	8,495	16,105	17,690	42,797	71,500
Railway operating income	133,626,434	104,254,743	61,627,962	46,866,442	7,189,392	4,275,801	15,248,000	10,959,594	49,561,080	42,152,906
Equipment rents—Dr. balance.....	7,053,712	6,398,167	3,799,566	3,535,953	d 632,442	d 454,014	115,672	d 110,518	3,770,916	3,426,746
Joint facility rent—Dr. balance.....	1,768,056	2,149,708	939,587	1,172,269	93,540	95,676	89,136	122,759	645,793	759,004
Net railway operating income...	124,804,666	95,706,868	56,888,809	42,158,220	7,728,294	4,634,139	15,043,192	10,947,353	45,144,371	37,967,156
Ratio of expenses to revenues (per cent)	70.02	73.48	70.22	73.92	64.33	72.73	71.70	76.13	69.84	72.23

FOR EIGHT MONTHS ENDED WITH AUGUST, 1925 AND 1924

Item	United States		Eastern District		Pocahontas Region		Southern Region		Western District	
	1925	1924	1925	1924	1925	1924	1925	1924	1925	1924
Average number of miles operated ..	236,663.02	236,107.92	59,469.73	59,533.85	5,509.92	5,510.51	38,518.18	38,355.71	133,165.19	132,707.85
Revenues:										
Freight	\$2,901,013,986	2,767,570,497	1,304,946,191	1,248,684,162	141,954,022	126,336,089	400,339,909	377,725,464	1,053,773,864	1,014,824,782
Passenger	c 700,652,473	e 730,960,725	346,526,016	355,037,666	15,289,413	16,781,754	100,622,188	100,105,952	238,214,856	259,035,353
Mail	63,514,460	63,860,756	24,330,199	24,481,283	1,656,640	1,583,186	9,090,541	9,021,028	28,437,080	28,775,259
Express	89,992,987	90,780,474	42,510,718	40,128,797	2,127,065	2,060,338	12,987,846	12,458,228	32,366,818	36,133,111
All other tran's'n	130,948,744	126,317,642	76,056,675	72,796,168	1,618,350	1,596,695	7,551,957	7,048,806	45,721,762	44,875,973
Incidental	81,750,665	78,008,445	40,143,899	39,778,321	2,757,378	2,707,809	9,539,975	8,547,690	29,309,413	26,974,625
Joint facility—Cr.	6,814,541	6,883,870	2,887,407	2,833,455	126,152	119,259	1,075,772	1,031,274	2,725,210	2,899,882
Joint facility—Dr.	1,678,218	1,705,155	567,087	844,342	16,961	18,007	274,082	244,210	820,088	598,596
Ry. operat'g revs.	3,973,009,638	3,862,677,254	1,836,834,018	1,782,895,510	165,512,595	151,167,123	540,934,106	515,694,232	1,429,728,915	1,412,920,389
Expenses:										
Maintenance of way and structures	540,745,817	528,945,633	228,901,328	216,556,615	23,523,664	22,229,628	76,994,311	72,761,377	211,326,514	217,398,013
Maint. of equipm't	840,592,930	843,311,219	404,872,591	402,916,828	39,340,718	37,757,572	105,486,681	106,282,586	290,892,940	296,354,233
Traffic	69,722,996	65,703,033	25,926,725	24,681,465	1,804,377	1,662,497	12,290,817	11,442,250	29,701,077	27,916,821
Transportation	1,416,278,548	1,442,795,236	668,348,524	689,061,783	46,490,280	47,437,459	188,013,220	188,708,891	513,426,524	517,587,103
Miscel. operations	35,411,811	33,340,471	16,024,761	15,858,769	704,102	678,995	4,134,182	3,302,101	14,548,766	13,500,606
General	115,820,331	112,701,778	51,163,008	49,804,563	3,708,190	3,547,083	14,965,581	14,600,139	45,983,552	44,749,993
Transportation for investment—Cr.	7,929,008	8,758,206	1,191,530	1,264,066	436,847	250,039	1,425,911	1,013,472	4,874,720	6,230,629
Ry. Oper'g exps.	3,010,643,425	3,018,039,164	1,394,045,407	1,397,615,957	115,134,434	113,063,195	400,458,881	396,083,872	1,101,004,653	1,111,276,140
Net revenue from railway operations	962,366,213	844,638,090	442,788,611	385,279,553	50,378,115	38,103,928	140,475,225	119,610,360	328,724,262	301,644,249
R'way tax accruals	232,493,243	220,018,832	97,467,956	90,684,136	10,010,957	9,568,932	31,567,832	27,387,319	93,446,498	92,378,445
Uncollectible railway revenues	1,156,177	1,409,110	553,318	652,522	42,742	32,190	149,333	132,986	410,784	591,412
Railway operating income	728,716,793	623,210,148	344,767,337	293,942,895	40,324,416	28,502,806	108,758,060	92,090,055	234,866,980	208,674,392
Equipment rents—Dr. balance.....	50,596,076	46,602,799	28,595,540	30,427,672	d 3,670,040	d 2,586,440	5,044,057	3,277,241	20,026,519	15,484,326
Joint facility rent—Dr. balance.....	15,358,110	14,182,146	7,487,721	7,140,429	729,469	762,658	905,841	843,842	6,235,079	5,435,217
Net railway operating income...	662,762,607	562,425,								

of management, are not sharing substantially in the benefits produced by their investment. A fair-minded public will recognize that this situation is not just to the investors. Impoverished railroads cannot possibly render the prompt, complete and exacting service which the public must have. Poor service is costly to the public."

Canadian Railways in 1924

During the year 1924 a total of 52,692 miles of track were operated by railways in Canada, according to a blue book of steam railway statistics just issued by the Dominion Bureau at Ottawa. Of that total 40,061 was single track, 2,619 was second track and 10,012 was yard track and sidings. The total showed an increase of 756 miles over the previous year. During 1924 there were 155 miles of track surveyed, 614 miles of new track under contract, 203 miles completed but not opened and 509 miles of track opened for operation during the year.

During the year the total amount of taxes paid by the railways was \$8,684,853, of which \$1,715,292 was income tax. Salaries and wages paid amounted to \$239,864,265, a decrease from the previous year of over \$13,000,000. The number of freight cars in service was 226,163 with a total capacity of 8,283,264 tons, or an average capacity of over 36 tons. Passenger train cars totaled 6,849. There were 5,857 locomotives in service, including 29 electric. The total fuel consumed was 9,307,372 tons at a cost of \$51,279,428. The consumption of ties totaled 14,294,416 at a cost of \$13,216,325.34. There were a total of 55 railways dealt with in the blue book.

Fiftieth Anniversary of Grand Central Y. M. C. A.

The Railroad Branch of the Young Men's Christian Association of New York City (the association of officers and employees of the New York Central and the New York, New Haven & Hartford who are connected with or run to and from the Grand Central Terminal) celebrated on October 14 and 15 its "Golden Jubilee," this being the fiftieth anniversary of the establishment of the "branch" on a small scale in an unused basement room of the old Grand Central Station. The branch today is in the elegant building at 309 Park avenue, which was put up for it when the Grand Central Terminal was enlarged. A principal feature of the celebration was the reading, by secretary W. W. Adair, of a brief historical sketch prepared by Chauncey M. Depew, chairman of the New York Central. Mr. Depew related how the start was made, on the occasion of reports of some of the excellent results which had followed a similar start at Collingwood (Cleveland), Ohio, where drunkenness, gambling and other immorality had been greatly abated by the Christian influences of the Y. M. C. A. The Cleveland people came to Mr. Depew and he went to Cornelius Vanderbilt (grandson of Commodore Vanderbilt), and the association was established.

Mr. Vanderbilt was the patron saint of this association throughout its career up to his death, having built for it the handsome building at Forty-fifth street and Madison avenue, which was torn down a few years ago to make room for larger buildings put up in connection with the enlargement of the Grand Central Terminal. The present Y. M. C. A. building at Forty-ninth street and Park avenue was largely or wholly given by the surviving brothers of Cornelius Vanderbilt.

Among those present at the celebration were George A. Warburton, formerly and for many years secretary of the branch, Dr. George Sherwood Eddy, and Albert Stone, 90 years old, who has been a member of the branch for fifty years. Mr. Stone has this month celebrated the seventy-fifth anniversary of his entrance into railroad service, as noted in the *Railway Age* of October 10.



Albert Stone

Rock Island Celebrates Seventy-Third Anniversary

The seventy-third anniversary of the Chicago, Rock Island & Pacific was celebrated at Kansas City, Mo., and Kansas City, Kan., on October 12 with an athletic tournament, a meeting of pensioned employees, a meeting of the 25-Year Club (employees who have been in service 25 years or more) a conference of officers and a musical program which was broadcast from radio station WGAF (Kansas City Star). The celebration was attended by 6,000 employees, 400 of whom were entered in the athletic tournament.

The tournament included track and field events, swimming, bowling, golf, boxing, wrestling, indoor and outdoor baseball,



Tug-of-War

basketball, horse shoe pitching and tennis. The division whose accredited representatives won the highest number of points in the various events was awarded the Gorman trophy, a large silver cup presented by J. E. Gorman, president of the road. The district with the highest number of points in the various events was awarded the Hayden trophy, a large silver cup presented by Charles Hayden, chairman of the board of directors. Several loving cups were awarded to winning teams in unit events. Gold medals for first place, silver for second and bronze for third were given winners in individual contests. Cups awarded winning teams or units in unit events are retained by the unit by which they are won until the next tournament. They remain permanently in the possession of units only when won three years consecutively.



Finish of the Mile Run

The athletic tournament was held at the Kansas City, Kan., high school athletic field and the swimming events were held in the indoor pool of the Kansas City, Mo., Athletic Club. Golf was played at the Lakewood Golf and Country Club. Three bands were present and played at the Union Depot, Kansas City, Mo., the Kansas City Athletic Club and the Kansas City, Kan., high school athletic field. Boxing and wrestling contests were held at the Rock Island baseball park at Kansas City, Kan., while indoor baseball and basketball games were played at the Kansas City, Kan., High School gymnasium. The closing function was a banquet held at the Baltimore Hotel, Kansas City.

Traffic News

C. & N. W. Seeks to Enjoin Illinois Commission Against Prohibiting Rate Increase

The Chicago & North Western has filed an application in the federal court at Chicago asking it to enjoin the Illinois Commerce Commission from interfering with the collection of increased suburban fares as approved by the Interstate Commerce Commission. Subpoenas have been issued to the governor, the attorney general, and the state's attorneys of five counties in Illinois, calling on them to show cause why the injunction should not be made permanent. The Interstate Commerce Commission ordered the increased tariffs put into effect, but the Illinois Commerce Commission refused to withdraw its ruling, made last spring, suspending them.

Freight Traffic in August

The volume of freight traffic carried by the railroads of this country in August totaled 41,723,156,000 net ton miles, according to reports filed by the carriers with the Bureau of Railway Economics. This was the greatest for any August on record with the exception of that of 1920, which exceeded it by 961,752,000 net ton miles or 2.3 per cent. The total for August this year, however, was an increase of 14.4 per cent over that of the same month last year and an increase of 3.4 per cent over that of August, 1923. The increase in the Eastern district was 20.1 per cent, in the Southern district 18.5 per cent, and in the Western 6.1 per cent. For eight months ending with August, the total was 292,197,012,000 net ton miles, an increase of 6.5 per cent over last year but a decrease of 4 per cent under the same period in 1923.

P. R. R. Has Record Year of Excursion Traffic

The Pennsylvania during the week-end beginning Saturday, October 10, operated excursions from New York, Philadelphia and other Eastern region territory to 23 destinations. These services were used by over 15,000 passengers and required the operation of 30 special trains.

The week-end also marked the inauguration of the first special excursion ever run from Washington, Baltimore and Philadelphia to Montreal, via the Hell Gate bridge route. This excursion carried a total of 1,434 passengers, of whom 930 were from Philadelphia and 504 from Washington and Baltimore.

Several weeks ago, the first Washington-Baltimore-Philadelphia excursion to Boston was announced. Seven trains were required to handle the 4,800 passengers who bought tickets for the first trip.

The Pennsylvania has had considerable experience in providing these long-distance excursion trips, at rates available to almost everyone. Excursions to Niagara Falls were the first to be inaugurated, quickly followed by trips to Washington, Pittsburgh and the Luray caverns in Virginia. The first excursion to the caverns carried over 5,000 people. Later Richmond, Lynchburg, and Charlottesville, Va., were added to the special outings. This year a number of new points of interest have been made available to the public through the medium of these low-rate week-end excursions.

Since 1914, figures show that the Pennsylvania's special excursion business has increased over 300 per cent. In 1920 approximately 650,000 people were carried on these trips. This number had increased in 1922 to 874,625, and in 1924 it reached a total of 1,002,479. It is expected that this year's excursion business will break all previous records.

THE ANNUAL MEETING and smoker of the Railway Club of Pittsburgh was held on October 22 at the Fort Pitt Hotel, that city.

H. R. CHARLTON, manager of the advertising bureau of the Canadian National, last week received in Montreal a cablegram to the effect that that railway's exhibit at the Wembley Exhibition in England had been awarded the certificate of honor and the commemorative medal for 1924. The 1925 award will be made later.

Commission and Court News

State Commissions

The proposed tariff filed by the Atchison, Topeka & Santa Fe, the Southern Pacific, the Western Pacific, the Los Angeles & Salt Lake, the San Diego & Arizona and the Pacific Electric of \$3 per car per day for the use of cars appropriated by the industries of California and used in intra-plant and inter-plant service, has been ordered suspended by the California Railroad Commission pending an investigation. The matter has been set for hearing before Examiner William P. Geary at San Francisco on November 30. This tariff was proposed by the carriers to prevent the industries from detaining freight cars unduly within the yard limits of their plants.

United States Supreme Court

Commission's Right to Relieve Carrier from Operation of Aggregate-of-Intermediates Clause

Section 4 of the Act to Regulate Commerce, as amended June 18, 1910, c. 309, 36 Stat. 539, 547, provides, among other things, "that it shall be unlawful for any common carrier . . . to charge any greater compensation as a through rate than the aggregate of the intermediate rates subject to the provisions of this Act." Suit was brought by shippers in the federal court for northern Georgia to enforce an order of reparation for \$30,000 which had been entered by the Interstate Commerce Commission against the Louisville & Nashville and the Director General on April 9, 1923. The district court sustained demurrers to the shippers' declaration, and entered judgment for defendant carriers. This was affirmed by the Circuit Court of Appeals, Fifth Circuit, 2 Fed. (2d) 592, which construed the plaintiff's declaration as seeking recovery only on the ground that the quoted clause of section 4 had been violated, and it affirmed the judgment because the shippers had failed to show that this violation had caused them special pecuniary damage. The case was brought to the Supreme Court of the United States on writ of error.

The shippers argued that the commission is without power to suspend the aggregate-of-intermediates clause. The Supreme Court holds that section 4 empowers the commission, upon special application, to "prescribe the extent to which such designated common carrier may be relieved from the operation of this section," and that since the date that the amendment of 1910 went into effect, this power is extended to the aggregate-of-intermediates clause as well as to the long-and-short-haul clause. It was also held that adequate and timely application for relief from the operation of the aggregate-of-intermediates clause had been made; and that if there has been an adequate and timely application within six months, which application remains undetermined,—or an application filed later and granted,—there can be no violation of section 4. Since there could be no recovery under section 4 because of the pendency of an application for relief, the judgment of the Circuit Court of Appeals was affirmed.—Patterson v. Louisville & Nashville. Decided October 12, 1925. Opinion by Mr. Justice Brandeis.

CHARLES E. HILL, general safety agent of the New York Central Lines, began this week at New York City an extensive and intensive safety campaign which is planned to bring safety instruction to all of the company's employees at substantially all terminals, shops and large stations, as well as at many other places. Mr. Hill, accompanied by other officers of the road, and, in particular, by division safety specialists on each division of the road, travels by a special train which started from New York on Wednesday morning. The itinerary calls for trips taking up three weeks, on the lines east of Buffalo, after which a similar campaign will be carried out on the lines west. It is expected to hold three or four meetings every day.

Foreign Railway News

N. de M. to Have Subsidiary Oil Company

President Calles of Mexico has authorized the National Railways of Mexico to form a subsidiary company for the purpose of operating petroleum properties owned by the road. The total production of the Mexican National Railways' oil wells in Mexico is estimated at 34,000 barrels daily.

Sir Arthur Watson Heads Buenos Aires & Pacific

Sir Arthur Watson, C. B. E., who retired as general manager of the London, Midland & Scottish in 1924 owing to ill-health, has been elected general manager of the Buenos Aires & Pacific. Sir Arthur started his railway career with the Lancashire & Yorkshire in 1890 and rose step by step to the general management, to which post he was elected in 1919. Two years later he became general manager also of the London & North Western and continued in that capacity when both companies were taken into the London, Midland & Scottish amalgamation.

Better Conditions in France

Traffic receipts on all large French railways during the period from January 1 to September 2, 1925, show a considerable increase when compared to the same period in the preceding year, according to figures received by the Bankers Trust Company, of New York, from its French information service.

DIFFERENCE IN FAVOR OF 1925

(In thousands of francs)

State	99,258
P. L. M.	226,250
Northern	85,042
Paris-Orleans	86,760
Eastern	59,543
Southern	48,424
Alsace-Lorraine	33,914

Owing to important reforms in their finances and management in 1921, the French railways have been enabled to overcome the greater part of the tremendous difficulties which they had to face after the war. The work of their reconstruction in the liberated regions also is now completed. The total receipts and expenditures of the French railways in 1913 and during the last six years were as follows:

FRENCH RAILWAY—OPERATING RESULTS

(In millions of francs)

	Receipts	Cost of operating	Operating ratio %
1913.....	2,020	1,276	63
1919.....	3,772	4,572	121
1920.....	5,797	7,700	133
1921.....	6,369	7,229	114
1922.....	6,948	6,545	94
1923.....	7,388	6,734	91
1924.....	8,738	7,493	84

Higher rates, both passenger and freight; a drastic curtailing of expenditures, as well as the constant increase of traffic, brought about a favorable change in condition of the railways since 1921. The actual operating expenses ever since then have been lower than the receipts and the operating ratio has steadily decreased.

In spite of higher prices, the passenger traffic shows a constant increase. The number of passengers, which in 1913 was about 400 millions, showed 524,342,000 in 1920, and 776,000,000 in 1924. Freight traffic also, which in 1913 showed 21,867,000 car-loadings, aggregated 22,000,000 in 1924, representing 265 million tons.

Danzig Railways Not Prospering

Railway traffic via the Free City of Danzig is far from satisfactory, according to Consul Kemp at that point. Business is being driven from the area by irksome passport and customs regulations.

The public line, formerly the West Prussian Railway, which before the war had a daily service of seven express trains to and from Berlin, now has only one each day, and the night express to Berlin over Dirschau, instituted in 1920, was stopped in 1923. The reason given for this reduction in service was lack of passengers, consequent upon the many interruptions for passport and

customs examinations. Passport control has also caused many to travel to Germany by boat who otherwise would take the train.

The privately owned narrow-gage railway, built originally for hauling sugar beets, is serving the farming districts of the Danzig lowlands. It has profited in passenger traffic by reason of the fact that it can deliver travelers into Germany without touching Poland. This advantage has been offset somewhat, however, by the long, slow journey, and by the competition from increasing numbers of motor buses that make the trip to the same points in less time.

Freight traffic on the narrow-gage lines is returning more and more to its original character of hauling sugar beets. Freight traffic on the standard-gage public lines is reported as suffering loss, compared with the previous year, owing chiefly to lack of adjustment to the recuperating demands of the territory served. For this reason it has become necessary to increase the facilities for handling goods in Danzig in order to meet the competition from German ports. Steps to attain this development have already been taken by the harbor board in charge of the port.

By a decision of the high commissioner of the League of Nations at Danzig, half of the former Prussian rolling stock was allotted to the Danzig Harbor Board and half to the Polish Railway Administration. As the latter body actually operates the equipment of the harbor board, it also keeps the stock repaired and replaced. Of the portion incorporated in other equipment of the Polish Railway Administration, the exact figures of the amount used or available in the free city of Danzig cannot be obtained from Danzig sources.

The financial valuation of the rolling stock and other properties of the public railways in Danzig are not readily obtained. Valuations by the Danzig, Polish, and German governments are not in agreement, and an actual valuation reported in process of fixation by the Reparations Commission is not yet settled.

In 1924, on the normal-gage lines, 9,379,132 passenger tickets were sold, 2,714,251 tons of freight were received, and 938,507 tons of freight were shipped. A statement of income, profit, and loss is said to be impossible to obtain for the territory of the Free City of Danzig alone, as there is no separation of accounts between the services operated by the Polish Railway Administration in Danzig and in Poland.

The narrow-gage railway, operated by the Westpreussische Kleinbahnen-Aktiengesellschaft, with headquarters in Berlin, for the year 1924, showed a total of 250,004 passengers carried, and 254,908 tons of freight, including livestock. Gross receipts amounted to 522,926 marks, of which 165,889 marks represented profit on a capital of 10,792,000 marks.

Improved Conditions on Uganda Railway

The operating ratio of the Uganda Railway for 1924 was 53.72 per cent, as compared with 66.44 per cent in 1923 and 87.21 per cent in 1922. These and other results are described in the report of the general manager for the year ended December 31, 1924, summarized by Modern Transport (London). Gross receipts during the year amounted to £1,635,189, as compared with £1,237,736 in 1923, an increase of 32.11 per cent, while operating expenses (£878,467) rose by only 6.82 per cent, and the excess of receipts over expenditure—£756,722—represented a percentage increase over the previous year of 82.19. As a result of changes in organization and strenuous efforts to reduce operating expenditure in 1923, there was a decrease of no less than 7.8 per cent in the figure under the latter head, compared with 1922, although the increase in earnings amounted to as much as 49.7 per cent.

The total route mileage at December 31 last amounted to 940 and track mileage to 1,013. Lines under construction totalled 206 miles, while the building of 288 miles of additional track had been approved and is now in progress. The recommendations contained in the last report as to the departmental control of construction were duly approved, and it is stated that "the experience to date has been sufficient to prove that in speed, efficiency and cost of construction lines built under the direct control of the administration will compare favorably with any lines hitherto built in Kenya."

It is stated that the system of native apprenticeship in the mechanical shops, which was inaugurated in 1923 and considerably extended during the year under review, is developing difficulties which require facing and firm handling. "The native pupil is very keen on taking up mechanical work and when first employed is deeply interested; but in time he develops a disinclination towards regular hours of duty and attendance at classes,"

says the report. "It is, of course, not an uncommon thing, even in a European community, to find youths bound by a contract of apprenticeship who dislike settling down to regular hours in workshops and regular attendance at classes, but parental and economic influences generally operate as a corrective which is unfortunately absent in the case of a native apprentice. The young native has no sense of responsibility, and the only way to counteract his tendency to avoid work whenever he feels inclined to do so is to punish him in the same manner as a healthy European schoolboy is punished when he deserves it. I have urged upon the government the need for conferring on the officer in charge of the native apprentice hostel the same powers of punishment as are ordinarily possessed by the headmaster of a school."

In contrast with the native youths who are apprenticed, adult natives who start as laborers continue to prove exceedingly satisfactory, and their progress is said to be highly gratifying. The number of African laborers in the shops steadily increases, and not only does the quality of their work show continued improvement but they are also proving themselves capable of employment on work of a considerably higher standard. Native engineers now employed number nine and native firemen 234, while four natives are employed as stationmasters at small stations. It is observed that one serious drawback to employment in these capacities is the absence of a consistent sense of responsibility on the part of the African. This difficulty will no doubt be overcome in time as the native develops, but meanwhile a considerable amount of responsibility is thrown on officers and staff. Progress has also been made in the training of Africans as sub-permanent way inspectors, and it has now been found possible in many instances, as vacancies have arisen, to replace Asiatics by Africans in this branch of the service. There is still, however, considerable room for improvement, not only in their training but also in the handling of their gangs.

At the commencement of the year 1924 the labor position throughout the whole system was fairly satisfactory, but during the latter portion of the year it gave rise to much anxiety in practically every department of the service. In the engineering department the policy has been adopted of recruiting the labor of the district as far as possible for all classes of work, both maintenance and capital. Some districts, however, have failed to produce workers, while during the last few months of the year those districts which could usually be relied upon to make up the deficiency also commenced to fail in their supply, chiefly due to the desire of the natives to remain in the reserves. Piece work on an extensive scale was introduced as an enticement to labor, but a slight improvement only was noticeable, and work of every description has been seriously retarded in consequence.

The Secretary of State for the Colonies having approved provisionally of certain principles recommended, the draft of a proposed order-in-council was submitted to the Legislative Councils of Kenya and Uganda, providing for the regulation, control and management of the railways, ports, harbors and lake services of the two territories. The draft order-in-council received the fullest possible consideration, and, after discussion and some amendment, was approved for submission to the Secretary of State, and is now receiving the attention of the imperial government. The central feature of the proposals is that the control, management and working of all railways, ports, harbors and steamer services in Kenya and Uganda and on the lakes shall be removed from the direct control of the Kenya government and vested in a High Commissioner of Transport, to be administered by him on defined principles on behalf of both Kenya and Uganda. The High Commissioner, who would be the governor of Kenya, would be advised on all matters of policy by an Inter-Colonial Railway Council, fully representative of Kenya and Uganda. Extended powers of management would be delegated to the general manager.

Some of the more important provisions of the proposed order-in-council are:

- (1) Complete separation between the revenue and expenditure of the governments and the revenue and expenditure of the railway, port and lake services.
- (2) The establishment of separate railway and harbor funds.
- (3) The operation of the railway, port and other services with due regard to agricultural and industrial development in Kenya and Uganda by means of cheap transport.
- (4) Profits remaining after provision for renewals, betterments, interest and sinking fund charges, etc., to be used in

reduction of railway rates, instead of being diverted for other government purposes.

(5) Governments requiring the provision of non-paying facilities to make good the loss in working resulting therefrom.

After approval and issue the order-in-council will be supplemented by local legislation in Kenya and Uganda, conferring powers on the new administration, defining the responsibilities of the administration as a common carrier, and, generally speaking, bringing the railway legislation of the two territories up-to-date.

Miscellaneous Notes

The following reports have been received by the Bureau of Foreign and Domestic Commerce from its agents in various parts of the world:

The Pintados-Iquique Railway (Chile) will purchase locomotives and other equipment with the proceeds from the sale of fiscal nitrate lands to be held in December. It is understood that the State Railways are preparing to ask for bids for a number of locomotives which will include the Santa Fe, Mikado, Garrett and Mallet types. The total number required is said to be 23, of which more than half will be either Santa Fe or Mikado type.

Belgium will build 350 kilometers of railway in Greece under a contract recently signed, and will completely equip the line; \$21,000,000 are involved.

The Bolzano-Brenner Railway (Italy) will be electrified. The royal decree providing for the financing of the project has been published. This section of the Brenner route is 58½ miles long, and forms a part of the line from Verona to Innsbruck, which constitutes the principal trunk line between Venetia and Austria and Central Europe.

Negotiations for direct service from Riga to Vladivostok and Peking are said to be the object of a visit of the director of the International Sleeping Car Company to Moscow.

The Argentine Congress adjourned without considering the railway expansion bill but a special session is expected.

The Argentine railways are buying rolling stock, the Buenos Aires & Pacific having just acquired from a British firm 18 new sleeping cars for use on its international trains. These orders are being placed with British manufacturers through the company's London agent.

The Argentine government has appointed a "Pan-American Railway Committee" to look after the interests of Argentina in the prosecution of the plan for a Pan-American Railway. The committee is composed of Ing. Juan A. Briano and Ing. Eduardo Sagasta.

Contracts have been awarded to German, Belgian and French firms for the supply of accessories for the Siamese State Railways. No American firms competed. A contract for four locomotives of the Mikado type, however, has been awarded to an American manufacturer at £4,750 each.

Italian railway receipts totaled 44,083,000,000 lire during year ended June 30, and net receipts amounted to 176,000,000. Expenditures included 28,500,000 lire carried to reserve fund.

Through transcontinental trains from La Paz to Buenos Aires via the Atocha-Villazon railway are now being operated. Passengers and freight may now be accepted for transportation. Passages direct from La Paz to Buenos Aires are being sold for 225 bolivianos, first class.

The third South American Railway Congress will be held in Santiago in 1927 in accordance with a decision reached at the second railway congress, recently authorized by the Chilean Government.

THE COLORADO TAX COMMISSION has reduced the taxes of the Manitou & Pike's Peak from \$200,000 to \$150,000, that of the San Luis Central from \$95,750 to \$75,000, and that of the Treasury Mountain from \$24,000 to \$12,000. The Chicago, Burlington & Quincy, the Colorado & Southern, the Denver & Rio Grande Western, and the Rio Grande Southern, made applications for reduction in taxes which were refused.

THE PENNSYLVANIA is equipping its dining cars with aluminum chairs, to be made by the Aluminum Company of America, Pittsburgh, Pa. The road aims to eliminate all fire hazards. The chairs will be so upholstered as to harmonize with the decorations. The Pennsylvania at the present time is operating 139 all-steel dining cars, and 10 new cars are under construction. The total seating capacity, including the new cars, will be 5,022.

Equipment and Supplies

Locomotives

BOSTON & ALBANY.—See New York Central.

THE CENTRAL OF GEORGIA is inquiring for five mountain type locomotives.

THE HOCKING VALLEY has ordered ten 0-8-0 switching locomotives from the Lima Locomotive Works.

THE NEW YORK CENTRAL has ordered for the Boston & Albany 25 heavy freight (2-8-4) type locomotives from the Lima Locomotive Works.

Freight Cars

THE CENTRAL OF GEORGIA is inquiring for 20 underframes for caboose cars.

THE SINCLAIR REFINING COMPANY is inquiring for 50 tank cars of 10,000-gal. capacity.

THE CHESAPEAKE & OHIO has ordered 4 air dump cars from the Case Crane & Engineering Company.

THE ILLINOIS CENTRAL is asking for prices on 200 double-deck stock cars. This company was reported in the *Railway Age* of September 12 as inquiring for 150 stock cars.

THE MISSOURI PACIFIC is inquiring for 250 stock cars and 500 box cars of 50 tons capacity. This is in addition to its inquiry for 2,250 cars reported in the *Railway Age* of October 17.

THE CENTRAL OF GEORGIA has increased its order from 1,000 to 2,000 ventilated box cars placed with the Tennessee Coal, Iron & Railroad Company and reported in the *Railway Age* of August 8.

THE SOUTH AFRICAN RAILWAYS & HARBORS is inquiring through the car builders for 50 hopper cars. This is in addition to the inquiry for 75 bogie fruit wagons reported in the *Railway Age* of August 29.

ATLANTIC COAST LINE has ordered 750 low side gondola cars of 50 tons' capacity from the American Car & Foundry Company. This company inquired for 500 gondola cars as was reported in the *Railway Age* of October 10.

THE MICHIGAN CENTRAL has extended its contract with the Illinois Car & Manufacturing Company, covering the conversion of 200 additional box cars into flat cars. In the *Railway Age* of October 17 this item was reported under the name of the New York Central.

Iron and Steel

THE CHICAGO, BURLINGTON & QUINCY has ordered 800 tons of structural steel for a mail building at Omaha, Neb., from the Paxton & Vierling Iron Works.

	Number freight cars on line	Cars awaiting repairs			Per cent of cars awaiting repairs	Month	Cars repaired		
		Heavy	Light	Total			Heavy	Light	Total
1924									
January 1	2,279,363	118,653	39,522	158,175	6.9	December	87,758	2,073,280	2,161,038
April 1	2,274,750	125,932	46,815	172,747	7.6	March	77,365	2,213,158	2,290,523
July 1	2,279,826	144,912	49,957	194,869	8.5	June	70,480	1,888,899	1,959,379
October 1	2,304,020	157,455	48,589	206,044	8.9	September	74,295	1,372,277	1,446,572
January 1, 1925	2,293,437	143,962	47,017	190,979	8.3	December	66,615	1,288,635	1,355,250
February 1	2,305,520	139,056	47,483	186,539	8.1	January, 1925	69,084	1,358,308	1,427,392
March 1	2,313,092	141,192	43,855	185,047	8.0	February	66,283	1,313,088	1,379,371
April 1	2,315,732	143,329	43,088	186,417	8.1	March	71,072	1,348,078	1,419,150
May 1	2,316,561	144,047	45,467	189,514	8.2	April	69,631	1,290,943	1,360,574
June 1	2,320,261	146,998	48,988	195,986	8.4	May	65,651	1,276,826	1,342,477
July 1	2,326,734	150,530	47,938	198,468	8.5	June	71,789	1,296,558	1,368,347
August 1	2,335,223	153,674	43,607	197,281	8.4	July	70,087	1,330,595	1,401,682
September 1	2,333,849	149,705	47,473	197,178	8.4	August	71,307	1,369,878	1,441,185

Data from Car Service Division Reports.

Supply Trade News

The Federal Cement Tile Company, Chicago, has established a branch sales office at Indianapolis, Ind., in charge of C. B. Baird.

The Harnischfeger Corporation, Milwaukee, Wis., plans the construction of an addition to its plant at 38th street and National avenue.

The railway sales office in Chicago of the French Battery Company has been removed from 11 S. Desplaines street, to the Conway building, 111 W. Washington street.

J. P. Carney, for the past 13 years general car inspector of the Michigan Central, with headquarters at Detroit, Mich., has joined the sales force of the Grip Nut Company.

George R. Doughty, assistant sales manager of the Republic Iron & Steel Company, Cleveland, Ohio, has resigned to become manager of sales of the Mill & Mine Supply Company, Akron, Ohio.

J. E. Tarleton, representative of the Union Draft Gear Company, Chicago, has been promoted to assistant to L. T. Canfield, vice-president in charge of sales and will take over part of his duties. Mr. Tarleton was born in 1885 at Nesquehoning, Pa., and was educated in the public schools at Weatherly, Pa. He started his business career in 1904 as a draftsman in the mechanical department of the G. B. Markle Coal Company at Jeddo, Pa., and remained in the employ of this company as a draftsman until 1909. In the latter year he was made draftsman in the mechanical department of the Union Draft Gear Company and in 1916 entered the sales department as a representative, which position he has held until his recent promotion.



J. E. Tarleton

The Standard Steel Car Company has awarded a general contract to the Austin Company, Cleveland, Ohio, for a one-story addition, 80 by 335 ft., and improvements to its present shop at Hammond, Ind., to cost approximately \$200,000 with equipment.

J. M. Robinson, representative of the Lincoln Electric Company, with headquarters at Grand Rapids, Mich., has been transferred to Detroit, to succeed R. G. Richards, resigned, and will be succeeded by G. W. First of the Boston office. J. E. Durstine has been appointed representative at Buffalo, to succeed S. B. Clapp, resigned. A. H. Homrichaus, representative at Chicago, has been transferred to Denver, Colorado.

The Air Preheater Corporation, 25 Broadway, New York, manufacturers of the Ljungstrom Air Preheater, is a consolidation of James Howden & Company of America, Inc., and the Ljungstrom interests of Stockholm, Sweden. The newly formed corporation takes over all Ljungstrom patent rights of the preheater, together with the shops of James Howden & Company of America, Inc., at Wellsville, N. Y. B. G. Brolinson has been elected president of the Air Preheater Corporation. W. L. Batt, president of SKF Industries, is chairman of the board of directors.

Obituary

Thomas Franklin Manville, chairman of the board of directors of Johns-Manville, Incorporated, died on October 19, in New York City at the age of 63. Mr. Manville for the past 25 years has been the directing head of Johns-Manville, Incorporated, producer and manufacturer of asbestos. His brother, H. E. Manville, who succeeded to the presidency of Johns-Manville, Incorporated, in 1924, has been closely identified with him during this entire period and will continue to direct the policies of the organization. T. F. Manville, in addition to serving as chairman of the board of directors of Johns-Manville, Incorporated, was president of the Arizona Asbestos Company; treasurer and director of the Asbestos Wood & Shingle Company; president and director of the Canadian Johns-Manville Company; director of the Fibre Corporation, and director of a number of several other companies.

Trade Publications

DAILY RECORD CHART.—A full size reproduction of the daily record chart produced by the Twin Type meter has been issued in folder form by the Esterline-Angus Company, Indianapolis, Ind. The Twin Type meter elements are the same as those used in single meters, but two records, synchronized as to time, are produced on one chart.

STEEL TAPE CABLE.—"The Story of Steel Taped Cable" is the title of a 24-page booklet issued by the Okonite Company, Passaic, N. J. The construction of the cable is shown in detail in this booklet, and a few of the manifold uses to which it may be put are pictured. Specifications and tables for cables of various voltages also are given.

PORTABLE AIR COMPRESSORS.—The Sullivan Machinery Company, Chicago, has issued a 32-page bulletin, No. 77-N, describing portable air compressors having capacities ranging from 110 to 258 cu. ft. of free air per minute. The equipment is described in detail with illustrations showing the character of construction and the application of the compressors to various classes of work.

INDUSTRIAL BUILDINGS.—The Austin Company, Cleveland, Ohio, has recently issued the eighth edition of its general catalog which contains illustrations and specifications of Austin standard, multi-story and single story buildings. Several charts and tables show the trend of building costs and comparative insurance rates and a section is devoted to a technical description and relative costs of various types of floors, walls, roof structures, etc.

SENTINELS OF SERVICE.—The Long-Bell Lumber Company, Kansas City, Mo., has issued an attractive booklet of 32 pages describing its creosoted yellow pine poles for signal and train control power lines and for telegraph and telephone service. The characteristics of this timber and the steps in the production and treatment of poles are described at length. The book is profusely illustrated with photographs of poles in railway and other similar service.

ELECTRO-MECHANICAL HAMMER.—The Kango electro-mechanical hammer, which is of a light chipping, caulking and scaling type, for use on metal, stone, wood or other material, is described and illustrated in a 12-page brochure issued by the Kango Company, Ltd., London, England. This hammer consists of a cylindrical casing fitted at the upper end with a stirrup-shaped handle, through which is led the cable for the motor and in which is situated the trigger switch.

LOCOMOTIVE SUPERHEATERS.—The Superheater Company, New York, has issued the fourth edition of its Instruction Book on the locomotive superheater, giving instructions for installation, operation, maintenance and repairs. This book supersedes the edition issued in 1917 and contains 87, 4½-in. by 6-in. pages. It has been completely revised and gives the latest recommendations relative to the installation, operation and maintenance of the Elesco Type A superheater. Questions and answers in the back of the book cover the principle of superheating generally. The subject matter is well supplemented with illustrations.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—Surveys are now being made in contemplation of the construction of a line from Ft. Worth, Tex., northwest to Post or some other point farther north on its line from southern Texas to the west, a distance of approximately 230 miles.

BOSTON & ALBANY.—This company has awarded a contract to the Tredenneck-Billings Company, Boston, Mass., for the building of canopies, platforms and penthouses for the new passenger station under construction at Springfield, Mass.

CENTRAL PACIFIC.—The Interstate Commerce Commission has authorized this company to construct a line from a point about 4 miles south of Weed station, Calif., to a point on its Klamath Falls branch near Grass Lake station, a distance of 23.8 miles; estimated cost, \$3,655,567.

CHICAGO & ALTON.—A contract has been awarded to the Lehrack Contracting & Engineering Company for the construction of a grain elevator and track at Kansas City, Mo., to cost \$450,000. Company forces are constructing a subway at Eighteenth street, Independence, Mo., which will cost \$46,000.

CHICAGO, BURLINGTON & QUINCY.—This company has given a contract to the Howlett Construction Company, Moline, Ill., for the construction of a 200-ton automatic coaling station of steel construction at Barstow, Ill.

CHICAGO, MILWAUKEE & ST. PAUL.—The power house at Benenville, Ill., will be enlarged and six new boilers, rated at 150 hp. each, installed.

GREAT NORTHERN.—The following construction projects have been authorized or are under construction: 250-ton steel coal chute at Sand Point, Idaho; elevation of grade along Crab Creek, Wash.; rebuilding of the commissary building at St. Paul, Minn.; extension of seven passing tracks on the Montana division; reduction of grade for a distance of approximately three miles on the Spokane division; 3,371 linear feet of new steel bridges to replace timber bridges; 669 linear feet of steel bridges, and 3,383 linear feet of concrete trestle and slab bridges to replace timber bridges.

ILLINOIS CENTRAL.—A contract has been awarded to the Ellington Miller Company, Chicago, for the construction of superstructures of an office building and a blacksmith shop at Paducah, Ky. This is a part of the large terminal now being constructed at Paducah, as reported in the *Railway Age* of September 5.

LEHIGH VALLEY.—This company has been authorized by the Interstate Commerce Commission to build a 0.3-mile extension to its Docks' branch in Bayonne, N. J., and the East Jersey Railroad & Terminal has been authorized to build an 820-ft. connection with the extension. The combined work will cost something over \$20,000.

MINNEAPOLIS & ST LOUIS.—This company has given a contract to the Howlett Construction Company, Moline, Ill., for the construction of a frame automatic coaling station of 200 tons' capacity at Montgomery, Minn., and another of 150 tons' at Olds, Iowa.

MINNESOTA WESTERN.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension from Lake Lillian to Dawson, Minn., 57 miles.

MISSOURI-KANSAS-TEXAS.—A new station, to cost \$25,000, is being constructed at Hominy, Okla. The building will be considerably larger than the old station and will have a stucco exterior.

MOBILE & GULF.—The Interstate Commerce Commission has authorized this company to acquire a logging road extending from a connection with the Southern at Fayette, Ala., and southward

for about 30 miles and to extend the line 3.5 miles to a connection with the Mobile & Ohio at Buhl. The extension will cost about \$11,500 per mile.

NORTHERN PACIFIC.—Bids have been received for the construction of a 50-mile branch line from Orofino, Idaho, into the Clearwater timber district in northern Idaho, reported in the *Railway Age* of September 26.

PENNSYLVANIA.—The construction of 6.2 miles of second track from Carrothers, O., to Bloomville, and the rearrangement of tracks at Carrothers, will be undertaken at once.

PENNSYLVANIA.—A contract has been awarded to Henry Steers, Inc., New York, for the foundations and concrete platforms for the building to be constructed at the company's Sunnyside yards, Long Island City, N. Y., for the use of the American Railway Express Company; approximate cost, \$150,000. A contract has been given to the T. J. Foley Company, Pittsburgh, Pa., for building an extension to the bridge which carries Seventh avenue, Pittsburgh, over the company's tracks; approximate cost, \$30,000. A contract has been awarded to the Seaboard Construction Company for the erection of a superstructure of a bridge at Yellow Creek, Ohio.

PENNSYLVANIA.—This company will in the near future begin the construction, in South Philadelphia, Pa., of a new produce yard and other extensive facilities for the most efficient handling of the city's rapidly growing fruit and vegetable traffic, now approximating 40,000 carloads yearly. The new yard will be located on a 41-acre tract, which the company has purchased. Included among the facilities will be two one-story freight sheds, each measuring 100 ft. by 650 ft. The trackage at the platform of these two sheds will have a capacity for unloading 100 cars simultaneously. There will also be provided a delivery yard and a holding yard. All of these facilities will be planned with a view to future extension and development as required. The plans also provide for a cold storage warehouse having a storage area of 75,000 sq. ft., to be built as need arises. Whether this will be constructed directly by the railroad company, or as an independently owned plant to be operated in connection with the yard, has not yet been definitely decided. Each of the two freight sheds will have a heated section extending one-half of its length, and suitable office facilities will be provided on a second floor to be erected over one of the sheds. Ample auction facilities, for patrons of the railroad who desire to dispose of their consignments on the spot, will be provided in one of the heated sections. It is expected that the entire project, as now contemplated, will, upon complete development, represent an investment approximating \$3,000,000, which may be increased in the future as additional facilities are found necessary.

SOUTHERN PACIFIC.—The construction of the following new lines, with the lengths and costs indicated, has been authorized: Black Butte, Cal., to Grass Lake, 23 miles, \$3,700,000; Valley Springs, Cal., to North Fork, 8 miles, \$575,000; Hinsdale, Cal., northerly into reclamation district, 5 miles, \$331,000. Other projects authorized include the construction of 22,355 ft. of additional yard tracks at Oakland, Cal., to cost \$100,000; the construction of a new creosoting plant, consisting of two retorts, an incising machine, tanks and a boiler house, 6,600 ft. of tram tracks and 13,500 ft. of yard tracks, at Oakland, to cost \$520,000; the construction of a brick station with stucco exterior and tile roof at Reno, Nev., to cost \$84,000; the installation of four fuel oil plants, consisting of 350,000 gal. reinforced concrete sumps, oil columns, pump houses and track facilities at El Paso, Tex.; Hatchita, N. Mex.; Noria, N. Mex., and Douglas, Ariz., to cost a total of \$66,000; the construction of 4,600 ft. of creosoted pile bulkhead and filling of submerged land with material dredged from channels, at Long Beach, Cal., to cost \$245,000, and the construction of a creosoting plant at Blair, Ore., to cost \$350,000.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS.—Bids are being received for the construction of 21 storage tracks, each 1,000 ft. long, at Jefferson avenue, St. Louis, Mo. Switch tracks and spurs will also be constructed.

UNION PACIFIC.—This company contemplates the construction of a passenger station at Long Beach, Cal.

UNION PACIFIC.—The construction of a freight and passenger station, 24 ft. by 42 ft., at Bell, Calif., has begun.

Railway Financial News

BALTIMORE & OHIO.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue \$6,125,000 refunding and general mortgage 6 per cent bonds to refund underlying bonds at maturity.

BOSTON & MAINE.—*Stock Selling Campaign.*—Kidder, Peabody & Co., Lee, Higginson & Co., and Harris, Forbes & Co., Inc., are managers of a syndicate, with which some 80 leading bankers and brokers of New England and New York will be associated, to begin an intensive campaign to sell \$13,000,000 prior preference stock provided for in the reorganization plan of the Boston & Maine. It is stipulated by the underwriting agreement that compensation for services and reimbursement of expenses will be payable only when the plan is declared finally effective, and when the entire \$13,000,000 of prior preference stock has been disposed of. The general readjustment committee, only after all these conditions are fulfilled, "agrees to pay to the syndicate managers for themselves and the syndicate, in cash, a sum equal to 3½ per cent of \$13,000,000."

The syndicate agrees to purchase from the general readjustment committee such portion of the \$13,000,000 of prior preference stock as is not subscribed for by stockholders, or otherwise disposed of, subject to agreement on its then fair market value, which shall be the price, less a commission of \$3 a share.

It is provided that the syndicate shall supply a loan fund up to \$500,000 for loans to stockholders of record for three years or more, holding 100 shares or less, who desire to subscribe for their pro rata share of the new prior preference stock, but whose financial circumstances would not otherwise permit them to do so.

The agreement provides that "as the participation of the New York, New Haven & Hartford is deemed to be of great importance in insuring the success of the reorganization program, it may become a member of the syndicate on the condition that its obligations shall be confined to assenting to the plan and subscribing, either directly or through the Boston Railroad Holding Company, to the shares of prior preference stock to which it is entitled to subscribe, and using its good offices so far as possible in making the plan successful."

CENTRAL OF GEORGIA.—*Equipment Trust.*—This company has applied to the Interstate Commerce Commission for authority for an issue of \$3,840,000 of 4½ per cent equipment trust certificates to be sold through Kuhn, Loeb & Co. at 96.89.

DENVER & SALT LAKE.—*Reorganization Plan.*—According to press reports, a plan for the formation of a new company to take over and operate the Denver & Salt Lake is expected to be ready for the approval of the reorganization committee when it meets in New York early in November.

FOURCHE RIVER VALLEY & INDIAN TERRITORY.—*Final Value.*—The Interstate Commerce Commission has found the final value for rate-making purposes of the property owned and used for common-carrier purposes to be \$250,000 as of June 30, 1916.

GEORGIA, FLORIDA & ALABAMA.—*Equipment Trusts Sold.*—Freeman & Co. and the New York Empire Company, Inc., have sold \$750,000 5½ per cent equipment trust certificates, Series "A," at prices to yield 5.10 per cent to 5.70 per cent, according to maturity. The certificates, dated November 1, 1925, will be issued under the Philadelphia plan. Principal and dividends are unconditionally guaranteed by the company by endorsement on each certificate.

ILLINOIS CENTRAL.—*Preferred Stock Authorized.*—The Interstate Commerce Commission has authorized an issue of \$14,218,230 of preferred stock, to be sold at not less than par for cash, and the proceeds to be used for construction purposes; also, a similar amount of common stock for conversion purposes.

KANSAS CITY SOUTHERN.—*Review of Valuation Case Denied.*—The Supreme Court of the United States on October 19 denied the petition of the Kansas City Southern for a writ of certiorari to review the decision of lower courts, which had denied the company's application for a writ of mandamus to compel the Interstate Commerce Commission to revise its method of valuation of the company's property. The commission, in a brief filed in the Supreme Court, had contended that the valuation could not be brought before the court by mandamus.

Approves Purchase of Gould Holdings.—The directors of the Kansas City Southern on October 20 formally approved the ac-

quisition of the Rock Island's holdings in the St. Louis Southwestern.

LOS ANGELES & SALT LAKE.—*Supplemental Tentative Valuation.*—The Interstate Commerce Commission has issued a supplemental tentative valuation report increasing the single-sum value for rate-making purposes as tentatively reported on June 7, 1923, for the property wholly owned and used as of 1914 from \$45,000,000 to \$45,200,000, the increase being attributable to an increase in the amount allowed for working capital from \$1,000,000 to \$1,200,000. The company had brought suit in the district court at Los Angeles to set aside the commission's tentative valuation and had submitted additional evidence which the court certified to the commission for its consideration. The commission then re-opened the case and took some additional testimony and after further consideration made the change noted. The difference of \$1,021,093 between the working capital shown in the books and that allowed was treated as property not used for common carrier purposes.

LOS ANGELES JUNCTION.—*Lease of Line Approved.*—The acquisition of control of a railroad under construction by the Central Manufacturing District, Inc., has been approved by the Interstate Commerce Commission, pursuant to the authority granted by the commission's certificate in Construction and Operation of Los Angeles Junction Railway, 99 I. C. C. 287.

MONTANA-WYOMING.—*Reorganization.*—The North & South, formerly the Wyoming North & South, has been succeeded by the newly organized Montana-Wyoming Railroad. The new company proposes to carry out the intention of its predecessor to continue the construction of the line north from Salt Creek, Wyo., to Miles City, Mont.

NATIONAL COAL RAILWAY.—*Securities.*—The Interstate Commerce Commission has granted authority to this company to issue \$305,500 common stock and \$150,000 first mortgage 6 per cent bonds for the purpose of constructing 8.5 miles of railway previously authorized by the Commission. The estimated cost of the line was \$470,000 and the company proposed to issue \$350,000 in stock and \$150,000 in bonds. The Commission's authority reduced the amount of the stock to \$305,500, in addition to which \$15,000 of stock was issued prior to the effective date of section 20-a. The stock is to be sold to proprietary coal companies and the bonds to Banks-Huntley & Co., Los Angeles, Cal., at 90.

NEW YORK, CHICAGO & ST. LOUIS.—*Merger Case.*—See article on another page of this issue, entitled "Nickel Plate Hearing Near End."

PECOS VALLEY SOUTHERN.—*Joint Note Authorized.*—The Interstate Commerce Commission has authorized this company to issue jointly and severally with L. W. Anderson a \$50,000 secured 6 per cent note, payable to the Texas & Pacific in 24 semi-annual installments. The first instalment of \$2,083 is to be due on or before January 15, 1926, and the remaining 23 instalments of \$2,083, each to be payable on or before July 15 and January 15 of each year. The applicant states that \$20,000 will be used for immediate repairs to shops, machinery, and locomotive destroyed or damaged by fire in August, 1924.

PITTSBURGH & WEST VIRGINIA.—*Abandonment.*—A certificate has been issued by the commission authorizing the abandonment of the Pittsburgh & West Virginia's South Side Yard, Pittsburgh, Pa., having six tracks with an aggregate length of 2,878 ft.

RUTLAND.—*New Director.*—Frank C. Partridge, of Proctor, Vt., has been elected a director to succeed Edmund R. Morse, deceased.

ST. LOUIS-SAN FRANCISCO.—*Bonds.*—Authority has been granted this company by the Interstate Commerce Commission to issue not exceeding \$1,750,000 of prior-lien mortgage 5½ per cent bonds, Series D, in connection with the purchase of stock of the Jonesboro, Lake City & Eastern.

Trend of Railway Stock and Bond Prices

	Oct. 20	Last Week	Last Year
Average price of 20 representative railway stocks	88.92	86.44	69.89
Average price of 20 representative railway bonds	91.58	91.43	87.87

Railway Officers

Financial, Legal and Accounting

W. L. Holder, land and tax commissioner of the International-Great Northern, has been appointed tax commissioner of the Gulf Coast Lines and the International-Great Northern, with headquarters at Dallas, Tex. **D. P. Pace**, industrial, land and tax commissioner of the Gulf Coast Lines, has been appointed industrial and land commissioner of both the Gulf Coast Lines and the International-Great Northern, with headquarters at Dallas.

Operating

H. E. Myrom has been appointed superintendent of dining cars of the Illinois Central, with headquarters at Chicago.

B. E. Myers, movement supervisor on the Pennsylvania, has been promoted to assistant trainmaster on the Toledo division, with headquarters at Detroit, Mich.

J. Reichert has been appointed superintendent of the Savannah division of the Central of Georgia, with headquarters at Savannah, Ga., succeeding W. H. Wright, transferred. **M. J. Parr** has been appointed superintendent of the Macon Freight Terminals, with headquarters at Macon, Ga., succeeding Mr. Reichert.

A. J. Chester, superintendent of car service of the Texas & Pacific, with headquarters at Dallas, Tex., has been promoted to superintendent of transportation, with the same headquarters, and the office of superintendent of car service has been abolished. **W. G. Humphrey**, chief supervisor of service, with headquarters at Dallas, has been promoted to superintendent of freight loss and damage claims, with the same headquarters, a newly created position.

W. H. Wright, superintendent of the Savannah division of the Central of Georgia, with headquarters at Savannah, Ga., has been appointed general agent, operating department, a newly created position. Mr. Wright was born on August 24, 1866, at Savannah, Ga., and was educated in the public schools there. He entered railway service in 1880 as a messenger for the Atlantic & Gulf (Atlantic Coast Line), and from July, 1883, to January, 1884, he was freight conductor for the Plant system (now Atlantic Coast Line). From January, 1884, to March 1, 1896, he was passenger conductor, and on the latter date became general yardmaster at Savannah, Ga., which position he held until March 1, 1897, when he was promoted to master of trains, Second division. On October 1, 1900, he became superintendent of the First division, of the same road, and held this position until 1903, when he became superintendent of the Savannah division of the Atlantic Coast Line. On January 1, 1907, he became superintendent of the Savannah division of the Central of Georgia, which position he was holding at the time of his recent appointment to general agent of the same line.

Traffic

E. J. Bray has been appointed general European agent of the Missouri Pacific, the Gulf Coast Lines, and the International-Great Northern, with headquarters at London, England, a newly created position.

L. H. Trimble, general agent of the El Paso & Southwestern, with headquarters at Los Angeles, Cal., has been appointed special representative of the freight department of the Southern Pacific, with the same headquarters.

I. F. Schwegel, general eastern passenger agent of the Louisville & Nashville, with headquarters at New York, has been appointed assistant general passenger agent, with headquarters at Louisville, Ky., succeeding Milton Smith, Jr., who has re-

signed. **J. R. Almand** has been appointed general eastern passenger agent at New York, in place of Mr. Schwegel.

Purchasing and Stores

G. F. Ohden has been appointed division storekeeper on the Illinois Central, with headquarters at Water Valley, Miss., succeeding W. E. Hoyt, deceased.

D. W. Corcoran, assistant general storekeeper of the Chicago & North Western, with headquarters at Chicago, has been promoted to general storekeeper, with the same headquarters, succeeding R. M. Blackburn, who has resigned. **W. L. Wheeler** has been appointed assistant general storekeeper, with headquarters in Chicago, in place of Mr. Corcoran.

Obituary

W. E. Hoyt, division storekeeper on the Illinois Central, with headquarters at Water Valley, Miss., died on October 13.

L. A. Rafert, assistant general freight agent of the Denver & Rio Grande Western, with headquarters at Denver, Colo., died in the Rio Grande hospital at Salida, Colo., on October 13, following an operation for appendicitis.

C. F. Martin, superintendent of transportation on the Canadian National, with headquarters at Vancouver, B. C., died in that city on October 16, as the result of an accident in the yard in which Mr. Martin fell beneath a freight train, suffering the amputation of both legs.

J. A. Kerwin, formerly roadmaster of the Chicago, Peoria & St. Louis, and a past president of the Roadmasters' and Maintenance of Way Association, died on October 19. Mr. Kerwin was a charter member of the Roadmasters' and Maintenance of Way Association and served as its president in 1904.

N. D. Miller, formerly chief engineer of the Great Northern and Spokane, Portland & Seattle, died at St. Paul, Minn., on October 9. Mr. Miller was born on June 20, 1845, near Vernon, Vt., and, having moved to Minnesota as a child, he was educated in the public school of St. Paul. All of his life from the age 18 was spent in civil engineering work in the Northwest, the greater part of it in the service of the Great Northern and its antecedent and subsidiary lines. He was chief engineer of that company from January, 1885, to January, 1895, and again from May, 1898, to May, 1899. From October, 1905, to May, 1908, he was chief engineer of the Spokane, Portland & Seattle, during which time the main line of that company was built from Spokane to Portland. Mr. Nelson retired from active service in 1915, and continued to live in St. Paul until the time of his death at the age of 81.

Charles C. Clark, general passenger agent of the Michigan Central, with headquarters at Chicago, died in that city on October 19, after a short illness from erysipelas. Mr. Clark was born on April 1, 1872, at Loveland, Ohio, and entered railway service in September, 1889, as a clerk in the office of the car accountant of the Cincinnati, New Orleans & Texas Pacific, now a part of the Southern. He was appointed soliciting passenger agent and assistant city ticket agent of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio, in August, 1895, and was promoted to traveling passenger agent in June, 1899. In January, 1902, Mr. Clark was promoted to central passenger agent and acting general southern agent at Cincinnati. He was promoted to general agent at Columbus, Ohio, in August, 1905, and in November of the same year was transferred to Indianapolis, Ind. He was transferred to Cincinnati in April, 1909, and in January, 1912, was transferred to Chicago as general agent of both the Big Four and the Michigan Central. Mr. Clark was promoted to assistant general passenger agent of the Michigan Central at Chicago in November, 1917. During federal control he served as manager of the Consolidated Ticket Office of eastern and southern lines at Chicago, being promoted to general passenger agent of the Michigan Central in March, 1920. He held that position until his death.